00037290

NOT TO BE ISSU UT
WITHOUT PERMISSION.

BOMBAY BRANCH
OF THE
ROYAL ASIATIC SOCIETY.
TOWN HALL, BOMBAY.

Digitized with financial assistance from the
Government of Maharashtra
on 05 October, 2018

REIGN OF

QUEEN VICTORIA

VOL. II

THE REIGN

OF

QUEEN VICTORIA

A SURVEY

OF

FIFTY YEARS OF PROGRESS

EDITED BY

THOMAS HUMPHRY WARD, M.A.

LATE FELLOW OF BRASENOSE COLLEGE, OXFORD

37290
ac

IN TWO VOLUMES

VOL. II.

VV-d-10

LONDON

SMITH, ELDER, & CO., 15 WATERLOO PLACE

1887

[*All rights reserved*]

37290

00037290

Stanford Geog. Estabt. London

THE REIGN

OF

QUEEN VICTORIA.

THE GROWTH AND DISTRIBUTION OF WEALTH.

Introduction.

FIFTY years ago the position of the United Kingdom as regards the production of wealth and the material comfort of its inhabitants, though it was even then the foremost in the arts of peace, was altogether inferior to what it has since become. The difference between the present time and fifty years since might indeed be properly described as one rather of kind than of degree. The Empire was then much smaller in many ways than it has since become. In India the Punjaub and other important territories since incorporated were still independent or quasi-independent, and the population of the peninsula admitting our virtual suzerainty must have been a third or a half less than it is now, while in everything which constitutes material prosperity the people were individually inferior. Australia at the same time was unsettled. The English dominion at the Cape was much narrower than it is. Canada was a thinly settled and half-rebellious province, with little sign of the development of those possibilities of extension of popu-

lation and settlement in the Far West which now make it a great dominion. But apart altogether from the question of the Empire, which will be considered in the sequel, the people who constitute the nucleus of the Empire at home were by no means possessed of the resources they have now. England, in fact, at that time had just gone through a long and difficult period, and was only on the eve of great economic changes, which have since been rapidly developed. The great war at the beginning of the century had taxed the national resources to the utmost. For many years the Government, it was calculated, had absorbed in taxation and loans about a third of the national income. The debt at the end of the war was about 900,000,000*l.* sterling, a third or a fourth of the estimated property of the country, and the annual charge for interest was 30,000,000*l.* sterling. For this and other reasons the nation struggled on through endless difficulties for twenty years after the war, hardly able to make both ends meet, subject to continual crises and difficulties in its trade, with prices constantly falling, with a plague of pauperism so enormous as to threaten to engulf the national fortunes, with continual inquiries by parliamentary committees and royal commissions as to the causes of recurring distress. The transition in the United Kingdom from an industrial *régime*, in which agriculture predominated, to one in which manufacturing predominated, was, at the same time, in its early stages, and the nation endured the miseries incidental to the rapid growth of a surplus population which agriculture was insufficient to employ, and to which the manufacturing system was yet imperfectly adapted, although the growth of manufactures alone rendered possible the existence of the large additional numbers. At any rate, whatever may be the explanation of the economic history of the country during the wars at the beginning of the

present century, and for twenty years after, there can be no doubt that the condition of things fifty years ago, as the matter would now be viewed, was lamentable enough. Out of 25,650,000 of people in the United Kingdom in 1837, nearly one-third, or 8,000,000, were in Ireland, the great majority in a state of semi-starvation, and constantly on the verge of a calamity like the potato famine, such as, in fact, overtook them nine years later. Of the remainder in Great Britain the great majority were still dependent on agriculture, or on rude labour of some kind. The armies of well-to-do artisans and factory operatives, and of the professional classes which have since grown up, until then by comparison were not. Indeed, one of the most lamentable features of the period of transition was the degradation of a huge army of handloom weavers called into existence by the earlier development of manufacturing skill, and then almost immediately doomed to extinction by the further improvements incidental to inventive progress, while as yet there was no such growth of miscellaneous manufacturing industry as to reduce and mitigate seriously the sufferings of particular classes whose machinery happened to be made obsolete by manufacturing invention. As yet railways and steam shipping were almost non-existent, not to speak of the thousand and one inventions in all departments which have since been developed. In the very year, 1837, from which the comparison begins, one of the severest monetary crises of the century broke out, and altogether the omens as to the condition of the people, and the momentary outlook in industry, were anything but cheerful. As affecting the affairs of Government more particularly, an inelastic revenue and a deficit which could not be grappled with were characteristic features of the early years of her Majesty's reign, and they reflected only too faithfully the general distress.

It would be impossible in the short space at my disposal to describe at length the successive stages of the improvement which has since been witnessed. Every decade seems to have witnessed more or less important changes, and the improvement to be recorded has taken place among great and threatening events, which could not but have involved huge disasters to the country unless widely extending and powerful causes, making for improvement and progress, had been at work In addition to this general statement I need only refer to the more important circumstances. First of all, in the decade 1837–47 came the railway mania of 1844–45, which at any rate had for good result a huge railway extension throughout the United Kingdom. Simultaneously the Free-trade policy, which has since been the settled policy of the country, was introduced, while the passage of the Bank Acts settled definitely and for a long period what seemed to be interminable currency controversies, and gave to the country a stable money. The potato famine and the monetary crisis of 1847, followed as they were by a year of revolution throughout Europe, with consequent interruption to business, constituted a sable cloud, to which the more favourable events of the period already referred to seemed only a silver lining; but great as were the evils involved in these calamities, the material changes of the period were really for the better on the whole. The advance of Free-trade, it need hardly be added, was itself promoted by the great industrial calamity of the period—the potato famine.

In the next decade the conspicuous events were the gold discoveries of California and Australia, coupled with the rapid extension of the railway system on the Continent as well as in England. At no earlier time had progress appeared so great. The changes of the previous period were apparently exercising a cumulative effect. The untoward

events of the time were the Crimean War and the Indian Mutiny, and another monetary crisis in 1857. But important as the two former events were from their political consequences, which have been far-reaching, their economic influence was not to be compared with that of the potato famine in the previous decade. The monetary crisis, again, was by no means so serious as that of 1847.

In the next decade there was continued railway extension, and now not merely at home and in Europe, but in India and in other outlying parts of the world, while steam shipping received further developments. In this decade, too, the extension of telegraphs began to be important; and just at the end of the period suboceanic telegraphy was beginning to be 'in sight.' The untoward event of the time was the great American Civil War, which suspended progress in the United States for several years, and caused a wide and far-reaching disturbance of industry through the cotton famine, which was one of its incidents; this disturbance, however, as far as England and its Empire was concerned, being not altogether of an injurious nature. There was also a great monetary crisis in 1866; but although this crisis was important enough in itself, and was full of big events, on account of the vast size to which the money market itself had grown, it cannot be said, I think, to have been in proportion so disturbing as previous crises were. If anything, there was even more advance in this decade than in the decade just before.

In the next decade, 1867–77, the conspicuous economic feature began to be the growth of the United States, which appeared to advance so quickly as to make up for the ground lost during the Civil War. There had, no doubt, been a rapid railway extension all through, but now the extension became truly colossal. Simultaneously, railway extension continued throughout the world, especially in new

countries. The development of steam shipping also took a remarkable start forward, the opening of the Suez Canal in 1868, and other circumstances, including economies in the consumption of fuel, which the improvement of the steam engine made possible, giving a stimulus to steam shipping business of an astonishing kind. One result has been a cheapening of the real price of raw materials and of food in the older European countries altogether without precedent, and which has had many consequences, mostly beneficial, but also not without drawbacks to particular classes. Perhaps in this period the rate of advance in the last fifty years culminated. The main untoward event was the Franco-German War of 1870–71, but this war was really of short duration, and did little permanent damage directly, while momentarily it was even beneficial to the United Kingdom. In 1873 there were severe monetary crises throughout the world, from which, by comparison, England escaped; while in 1875 there was a time of trouble in English finance, which did not, however, culminate in panic. Great as these financial events were, they did not disturb industry as former monetary crises had done. The industrial world was more strong to bear them. One economic result or immediate sequence of the Franco-German War, viz. the demonetisation of silver and more extensive use of gold as standard money, is believed to have had great effects, not altogether beneficial, which are still being felt, mainly in a remarkable fall of money prices. But the fact need only be mentioned here so as to complete the history.

In the last decade of all, viz. 1877–87, not yet quite completed, the conspicuous events have again been—extension of railways, extension of steam shipping, and extension of telegraphy, which have further increased the cheapening of raw materials and of food already referred to. It seems

doubtful, however, whether advance has been quite so rapid as in the two previous decades, though it has still been very great. The great fall in money prices has disturbed business a good deal, and at any rate makes the real advance more difficult to describe and interpret. The calamity of the period, as far as England is concerned, has been a long series of bad harvests, commencing towards the close of the previous decade and culminating in 1879. In former times the calamity would have been of the first magnitude, and it has still been a serious matter in many ways—mainly, however, through the shock to the landed interests which the bad harvests coupled with low prices have caused, and not in the old way, through the distress and misery of the masses.

Generally, it may be said, the external events of these fifty years have been of a kind to produce many evil effects, and this must still have been their tendency, but the causes for advance, conspicuously the development of railways, shipping, and telegraphs, as well as of miscellaneous inventions, have been so great and powerful that the progress of society in material wealth has, by comparison with former periods, been astonishingly rapid and steady. The manufacturing system in its fuller development, as compared with the transition stage fifty years ago, appears to secure a steadily large production; and as compared with what was the case under a purely agricultural *régime*, the country is not only richer absolutely, but the extremes between good and bad years are less than they were, and even the greatest and most untoward events are less in proportion than they were.

I propose now to examine a little in detail and under different headings what this great advance has been.

Increase of population.

The advance in population itself is the first point to notice. An increase of the numbers of a people, if the

quality is unchanged, is an increase of resources; still more, if the quality improves. The most obvious facts prove that in both respects in this country there is enormous advance.

The population of the United Kingdom, which in 1837 was 25,650,000, is now, in round figures, according to the Registrar-General's estimate for 1886, with an addition for 1887, almost exactly 37,000,000. The increase in fifty years is consequently about forty-four per cent. In mere numbers the nation is about half as much again what it was. The advance has not been quite uniform. Twenty years after 1837 the total had only grown to 28,000,000, the effect of the Irish famine being in fact writ large in these population figures. Since 1857, however, the increase has been by leaps and bounds. In 1867 the total was nearly 30,500,000; in 1877 it was no less than 33,500,000; and now, as already stated, it is 37,000,000, or rather more. The more rapid advance of the last thirty years, as compared with the earlier years of the period under review, thus coincides with a more rapid increase of population.

The increase of population is, moreover, chiefly in England, and to a less degree in Scotland, while the population of Ireland has declined. England and Wales fifty years ago held 15,000,000 of people only; now over 28,000,000. Scotland fifty years ago held 2,500,000 only, now just over 4,000,000. In England and Scotland, therefore, the increase is altogether 14,500,000, or nearly 3,500,000 more than the total increase in the United Kingdom. The difference represents the loss of population in Ireland, which has in fact diminished from a little over 8,000,000 fifty years ago to less than 5,000,000 at the present time. These circumstances undoubtedly indicate an improvement in the industrial quality of the population. Absolutely and relatively a poor and semi-starving class in Ireland has declined.

Their place has been taken by the artisan classes or factory operatives in England and Scotland. It should be added, also, that while as regards the United Kingdom generally population hardly increased between 1837 and 1857, yet the reason was exclusively the Irish famine. In England and Scotland the increase was almost at as great a rate in those years as it has since been, though in absolute amount it is of course greater in the last three decades. The industrial population of the United Kingdom has thus been steadily increasing for half a century. At the present rate of advance, the population of the United Kingdom will be nearly 45,000,000 by the end of the century.

The difficulty of comparing the Census returns as regards the occupations of the people is very great. But the work has been attempted by skilled statisticians, with results satisfactory enough as far as the present purpose is concerned. Neither agricultural nor general 'labourers' increase in numbers. The increase in England and Scotland, whatever it has been, has either been in the professional or the commercial classes, or in the higher ranks of handicraft or factory labour—skilled labour of some sort. In some directions there may be less call upon the skill or intelligence of the individual workman than there was formerly, but the multiplication of machinery, the increased taste for artistic productions, and the spread of education, have all improved the industrial quality of the population, or necessitated the improvement. This question is not one for figures, but the figures that are to follow would hardly be *vraisemblable* if we did not allow for some such change.

Progress of income and capital.

It will be convenient to take next the property and income tax returns. The advantage of these returns is that they contain in the gross assessments a record of the total income from the chief descriptions of property in the country, as well as of the income of the salaried or wage-

earning classes as respects all income above a certain minimum amount. As regards income-yielding property, therefore, the returns are tolerably complete, and their serviceability is not destroyed by the totals comprising income of a different nature, as that income is probably connected with the income from property itself, and rises or falls simultaneously with it, and it can, if need be, be discriminated from the rest. Of course in using such figures the possibility of changes in money values irrespective of changes in real wealth has to be considered, and this point will not be forgotten.

The broad fact as regards these income tax assessments is striking enough. We have no figures before 1843 for Great Britain or before 1853 for Ireland, the income tax having only been reimposed in Great Britain at the former date, and only imposed for the first time in Ireland at the latter date. But using the figures thus obtained,[1] and working back, allowing for the slow rate of increase between 1815 and 1843, we can hardly put the income which would have been liable to assessment in 1837 at more than 270,000,000*l.* sterling. In 1887 the corresponding figure may be placed in round figures at 630,000,000*l.* The increase in all is 360,000,000*l.* or 133 per cent. Per head of the population the increase is from about 10*l.* to 17*l.* or about 70 per cent. If the income tax is in any way a fair measure, the resources have increased in the proportions stated in absolute amounts and per head. If nominal values are more in proportion to the things they represent than they were, the real increase cannot of course be so much; but if they are less in proportion, the real increase must be more.

Before discussing the latter point, or looking at things

[1] Viz. gross assessments Great Britain, 1843, 251,000,000*l.*; Ireland, 1853, 32,000,000*l.*

in detail, it may be convenient to present the figures in a different way. Subject to many qualifications, it seems possible to fix on a nominal sum as representing roughly the aggregate property or accumulated wealth of the people of the United Kingdom at different times. Although such a sum can only approximate in the roughest fashion what the reality would appear to be if a proper valuation could be made, yet it may be of some use in the absence of a better figure. Using the figures of the income tax mainly as a basis, I arrived at a total of 8,500,000,000*l.* as such a nominal sum, representing the property of the United Kingdom in 1875, the amount being equal to about fifteen years' purchase of the income tax income, which a previous estimate by a good authority had carried as high as twenty years' purchase. Applying this number of fifteen years' purchase, then, to the above income tax figures, viz. 270,000,000*l.* for 1837, and 630,000,000*l.* for 1887, we should assign the sum of 4,050,000,000*l.* as the capital or property in 1837, or about 150*l.* per head; whereas the corresponding figures at the present time would be 9,450,000,000*l.* or about 256*l.* per head. The figures, of course, correspond with those of the income from which they are derived; but stated in this form they permit of some comparisons which could not otherwise be made. It now becomes interesting to note that while the debt per head fifty years ago was about 30*l.* or one-fifth of the property in the country, it is now very little more than 20*l.* per head, not having been much reduced in the interval, and this 20*l.* is only about one-thirteenth of the property in the country! So enormous is the change made by the advance of the last fifty years, and at any rate as far as the debt is concerned the change must be real and not merely nominal.

But does the increase of nominal values correspond to

the increase in real resources? On this head the points to be discussed presently will throw some light, as we shall be dealing with quantities of production and trade, and not merely with values; but broadly it may be stated as an undeniable and generally admitted fact that the prices of commodities, on which very largely the nominal values of fixed and floating capital and of property in general would depend, are lower and not higher than they were fifty years ago. The course of prices of the leading wholesale commodities has been somewhat closely studied for many years. Whether we follow Mr. Jevons's investigations, or the course of the index number which Mr. Newmarch devised about 1860, or the index numbers devised for imports and exports by the Board of Trade, or the index number of Mr. Sauerbeck,[1] or the prices in France as discussed by Mr. Palgrave in his memorandum for the Trade Depression Commission, or the index number of Mr. Soetbeer,[2] formed largely from Hamburgh prices, the result is substantially the same—a great rise of prices between 1850 and 1873, but a heavy fall after that date that has brought them back, according to all but one of the statements, to the level of 1845–50, which was the lowest on record from the beginning of the present century until now. Apart from these facts there is a general consideration of material importance in this connection. From century to century there is a tendency for many real prices to decline. New inventions of every kind bring new articles into existence, while old articles are produced by new processes which literally make the price only the barest fraction of what it formerly was, till we have such a phenomenon as steel selling for a twentieth of the money price it realised not so very long ago, and sugar selling for 2*d.* or 3*d.* a pound wholesale, instead of twenty times that price only

[1] *Journal of the Statistical Society*, Sept. 1886.
[2] *Materialien* &c., Puttkammer and Mühlbrecht. Berlin, 1886.

a few centuries ago. What used to happen formerly in centuries now happens in shorter periods; and if leading wholesale articles are as a rule as cheap as they were, it follows that there must be masses of miscellaneous articles, like steel, either not in existence fifty years ago, or produced in greater quantities since then, which have enormously fallen in price. The change in aggregate money income and capital that has been described, therefore, represents in all probability a less advance in resources than what has actually taken place. It may be doubted whether at any time during the last fifty years the rise in money income exceeded the real progress; but this rise in the ten years 1867–76 was about 40 per cent., or, allowing for the increase of population, about 25 per cent. per head. At any rate an increase of 70 per cent. per head in the fifty years, allowing for all the changes that have occurred, and for what is known as to the course of prices in the interval, appears to be in no way improbable.

The details of income tax progress confirm the tale. When the above increase of income and property is analysed, it is found to be very largely an increase of the assessment for houses. In 1843 the amount of the assessment of houses in England alone was about 36,000,000*l.*, and the total for the whole of the United Kingdom on that basis could not then have been more than about 40,000,000*l.* Now the total is 127,000,000*l.* or three times the total of fifty years ago and more, the increase altogether being about 90,000,000*l.* out of a total increase of 360,000,000*l.* in the income tax returns, or exactly one-fourth. Railways are another large branch of income tax assessments now; but the amount of home railways alone fifty years ago could not have been more than 1,000,000*l.* or 2,000,000*l.* sterling, so little advance had been made towards a railway system, while now the total is 37,000,000*l.* Almost the

whole of the capital invested abroad has also been an investment of the last fifty years, having taken place partly in connection with the continual emigration, and partly in connection with the growth of railways in the colonies and foreign parts in the interval. The income thus to be accounted for, though classed in various headings in the income tax returns, can hardly fall short of 40,000,000*l.* or 50,000,000*l.* sterling. Much the same may be said of the public companies generally, which are so largely a modern creation, and the income from which, exclusive of railways and foreign investments already referred to, constitutes so large a part of Schedule D.—not less, apparently, than about 60,000,000*l.*, almost all an increase of the last fifty years. Very little of the increased income from property would appear, in fact, to arise from increased nominal values only, as might have been inferred from an excessive and disproportionate increase under such a heading as 'lands,' where in fact the increase is comparatively small. As regards capital values, again, the mode of calculation above adopted, though for convenience' sake it is spoken of as capitalising the whole income tax income at so many years' purchase, is really much more detailed. It omits practically all income from other sources than property, while the value of property not yielding income is calculated as a certain proportion of the value of houses.[1] It is easy for anyone interested, therefore, to form an opinion as to whether the mode of calculation is likely or not to exaggerate the real increase which has taken place. The value of houses and their contents is 'half the battle.' For the bulk of the remaining estimates, also, various tests can be applied. Anyone can see and judge whether under these headings a general increase like what has been described is likely or not to have occurred

[1] See for details my essay on 'Recent Accumulations of Capital in the United Kingdom,' *Essays in Finance*, 1st series, 4th edit. p. 161 &c.

apart from an increase in money values merely due to monopoly or some such cause.

Progress of national revenue.

The next subject I propose to look at is that of revenue. Fifty years ago, as already stated, there was a difficulty in making two ends meet. There was a recurring deficit, and Chancellors of the Exchequer found a difficulty in imposing new taxes. This was with a revenue from all sources of about 60,000,000*l.* sterling only.[1] Now the revenue in round figures is about 90,000,000*l.* sterling. Nor is there any deficit even in the worst years in any proper sense of the word, although it has happened that the sinking fund has been partially suspended—that is, that the reduction of the debt, instead of being 7,000,000*l.* or upwards a year, as it usually is, has been two or three millions less. The situation, in fact, is as opposite as possible to what it was. There are endless ways in which it would be possible for the Chancellor of the Exchequer to increase his receipts.

This last point, it may be stated, is not wholly a matter of conjecture. For many years past an account has been kept of the amount of revenue given away by the reduction or repeal of taxes, and of the amount derived in the first year from new impositions. The balance shows an excess of reductions in the years 1838-86 amounting to no less than 21,000,000*l.* So much taxation could be reimposed without making the taxpayer any worse off than he formerly was. Even more taxation could be reimposed. Most of the reductions or abolitions of taxes above referred to took place many years ago. If the same taxes were to be reimposed now—for instance, if the tea duty were to be raised to a shilling, or a sugar duty were to be reimposed—the

[1] The figures in the finance accounts of the time appear to show a smaller total than this; but allowing for changes in the interval in the form of the Budget, the figures in the text may be considered fairly correct for the purpose of comparison with the present time. See appendix to Mr. Goschen's Report on Local Taxation, No. 470, Sess. 1870, pp. 119-131.

increased or restored duty would be greatly more productive than it formerly was. The increased margin of taxation is thus much larger than what would appear from a bare statement of the difference between the amounts of taxation imposed and remitted, based on the figures of the amounts yielded at the time the changes were made.

It should also be added that the increase of gross revenue is not altogether an increase of the amount levied by taxation, to be qualified only by the allowance that the taxation itself is lighter, and the country is much more able to bear it. To a large extent the increase of the gross revenue is the evidence of a mere extension of the profitable business of the Government. Fifty years ago the gross income of the Post Office Department was about 1,500,000*l.* only, now it is 10,000,000*l.* The difference, which is nearly one-third of the sum by which the imperial revenue has increased, represents a charge by the State for new services rendered, and is not in any popular sense an increased yield of taxes. The amount yielded by imperial taxation has in truth increased very little in fifty years, while taxation itself, as we have seen, has largely declined. The great prosperity of imperial finance in the last fifty years is thus one of the remarkable features of the time.

What has been already said regarding the proportion of the National Debt to the capital of the country confirms this view of financial prosperity. But it should be distinctly noted that although this point is not material in comparison with the reasons already given for the reduction of the proportionate burden of the debt, yet the debt itself has declined both in amount and in the annual burden of interest. Now the debt is 740,000,000*l.*, involving an annual charge of about 22,000,000*l.* for interest; fifty years ago the corresponding amounts were 820,000,000*l.* and 28,000,000*l.*

Fortunately or unfortunately, it has to be added that,

while the above are the facts as to imperial revenue, the progress in regard to local taxation and expenditure has been somewhat different. Here there is no doubt as to the growth of a burden on the community. There is some difficulty in arriving at the facts fifty years ago; but taking the figures of local taxation for 1843 as given in Mr. Goschen's report on local taxation[1] (p. 125), it would seem that the amount raised by local taxes in the United Kingdom was then about 14,000,000*l.* annually, as compared with 43,000,000*l.* or thereabouts at the present time. Local expenditure has increased in even greater proportion, and only does not lead to proportionately increased taxation on account of the large amount of borrowing, about 12,000,000*l.* annually, that goes on. In other words, then, local taxation has increased about 30,000,000*l.* in fifty years, and ought perhaps to have increased rather more; and this is a distinct set-off to the diminution of the load of imperial taxation. But even here it has to be considered that the *rate* of the taxes has not increased. As the growth of the income tax assessments shows, there is a largely increased property to bear the burden. It has also to be considered that if the burden is new, the community gets the benefit in better education, better drainage and sewerage, and in gas and water, and those improvements which the great concentration of people in large towns renders necessary. The taxation to some extent is a deduction from the property in houses which the community meanwhile has acquired. Without the improvements the property would not be so valuable as it is.

And when all is said, putting imperial and local taxes together, there is a great and manifest improvement between the present time and fifty years ago. Imperial and local revenues together fifty years ago amounted to

[1] See note, *supra*, p. 15.

about 75,000,000*l.* sterling, and in round figures this was the 'taxation.' Now the revenues together, but deducting from the gross total the loans received by local authorities, amount to about 135,000,000*l.* sterling—an increase altogether of about 60,000,000*l.* sterling, of which one half is imperial and the other half local. We have seen, however, as regards the imperial taxes, that the increase is not all taxation in the popular sense of the word, but partly an increase of other sources of revenue; that the increase, whatever it is, is an increase of the yield of taxation only, many taxes having been repealed or reduced in the interval; and that, in fact, the taxation remitted in excess of the taxation imposed amounts to the large sum of 21,000,000*l.*, by which sum, and more, it would be possible to add to the taxes without increasing the burden of the taxpayer as compared with what it formerly was. If the burden of local taxes has, on the other hand, increased, it has also to be considered that the rate of the taxation has not increased, the resources of the taxpayer having increased in even greater ratio, while the increase of the burden, whatever it is, is set off by the diminution of the imperial burden, and by the fact that it represents very largely a mere deduction from new property created, without which that property itself would not have existed. In all respects, then, the history of the nation's finances, national and local together, corresponds to the fact of progress which the increase of population and the increase of income tax assessments would imply. It is altogether a prosperous finance, such as would be looked for in a prosperous country.

Progress in leading industries.

In a general statement like this, it might, perhaps, be unnecessary to go farther. There is no necessity for going into details when the general account is so good. But to look at some of the leading industries in the concrete strengthens the main impression, while furnishing proof

incidentally that if it were possible to deal with general expressions of quantity, and not merely with values, the testimony to advance would be much the same. The references on this head must, however, be brief.

Coal. Coal is plainly one of the most important things to study in this connection. It is an instrumental article, depending for its consumption on the general prosperity of other industries, or on the prosperity of the average householder. Much of the article is no doubt raised for export, which would seem at first sight to be a different use. On consideration, however, it appears that coal is exported largely to be consumed in English steamers abroad, or in factories run by English capital, so that the uses of coal exported are much the same as the uses of the coal consumed at home. It is still an instrumental article in the working of English industry generally. The production of coal, then, has increased about four times in the last fifty years. At present the total output is about 160,000,000 tons. In 1854, when the mineral statistics of the United Kingdom begin, it was about 64,000,000 tons only; and going back from that date to 1837, and allowing for the rapid increase which would be occasioned by the development of railways and machinery in the interval, we cannot put the figure for 1837 at much above 40,000,000 tons. Contemporary estimates were mostly below that figure. So far as coal would be a measure, then, the increase of income tax assessments has been less, and not more, than the increase of the things which constitute national wealth. The increase is 300 per cent.; that of the income tax assessments 133 per cent. The increase of population, as we have seen, is less than 50 per cent.

The increase in coal was most marked between 1857 and 1867, the production in the latter year having reached

the large total of 105,000,000 tons, or an increase of nearly 70 per cent. in ten years. In the following ten years the increase was to 135,000,000 tons, or 30 per cent. only; and since 1877 it has been to 160,000,000 tons, or 18 per cent. only. Of course the figure for 1887 can only be estimated, but no probable development of trade in one year is likely to alter the percentages of increase very much. It does not follow from such figures that the growth of prosperity has been at a diminishing rate since 1857. The increase in the efficiency of coal has been, it is believed, enormous. But it is expedient to state all the facts; and if coal is to be considered an instrumental article, the apparent slackening of the rate of progress should be noted. The great increase in income tax assessments was not between 1857 and 1867, but in the following decade. The slower rate of increase in these assessments in the last decade of all coincides, however, with the slower rate of augmentation in the production of coal. Too much must not be made of this apparent coincidence, for the reason already stated, viz. the increased work done by the same quantity of coal in consequence of improvements in the engines using it, but that there is something to be explained must be conceded to the pessimistic observer.[1]

Iron. Pig iron is another instrumental article. The history is much the same as that of coal. Fifty years ago the production was estimated at 1,250,000 tons only. Now it can hardly be put at less than 8,000,000 tons, an increase of about 6,750,000 tons, or about 550 per cent. Even allowing for an under-estimate fifty years ago, the increase would still be enormous. In 1854, when the mineral statistics were introduced, the production was only about 3,000,000 tons, since which the increase has been

[1] See Jevons on *Coal Supply*, p. 207; and *First Report of Royal Commission on Trade Depression*, p. 139.

about 5,000,000 tons, or about 160 per cent. The percentages of increase to be dealt with are enormous.[1]

The chief textile industries tell the same tale. The annual consumption of raw cotton in 1836–40, according to Messrs. Ellison, was about 406,000,000 lbs.; in 1881–84 it was 1,470,000,000 lbs., an increase of 260 per cent. The annual average is now somewhat higher. It is difficult to obtain comparative figures for wool on account of the difficulty of estimating the domestic clip, but the annual consumption is placed by Mr. Porter about the year 1840 at about 200,000,000 lbs.,[2] which compares with about 400,000,000 lbs. at the present time. Mr. Porter's figure is perhaps an over-estimate, but in any case the increase in consumption is enormous, though less than it is in cotton. Wool, however, has always been an important industry, and the textile manufactures apparently should be taken together in such comparisons, as they compete with and depend on each other. Textiles.

The linen manufacture, judging by the exports, shows an enormous increase since 1837—about 157 per cent.; but there is rather a decline of late years from a maximum reached about the time of the cotton famine—another reason for taking all the textile industries together.

The jute manufacture, again, is a wholly new industry since 1837, and exhibits an enormous development, the annual consumption being about 4,500,000 cwts. or 500,000,000 lbs.

Per contra, the silk manufacture has greatly declined; but it had never possessed the importance, as far as the employment of labour is concerned, of the other leading textile industries.

[1] See Jevons on *Coal Supply*, p. 192; and *First Report of Royal Commission on Trade Depression*, p. 139.

[2] See Porter's *Progress of the Nation*, pp. 175–76, edition 1847.

The nett result of this comparison is that, while cotton leads the way by an enormous increase of the consumption of raw material (the increase here being quite on a par with the increase in the production of coal and iron), yet the increase in wool is also enormous, being about 100 per cent. The linen manufacture also shows an increase over the whole period, though it is not at present increasing, while an entirely new manufacture, that of jute, has come into existence. Silk is the only leading textile manufacture which has declined, and it is of less importance than the others. Generally, there is no doubt, the textile manufactures have increased in enormously greater ratio than the increase of income tax assessments or of population. In consequence of the development of manufacturing industry also, each pound of raw material consumed probably represents a much greater amount of manipulation than was the case fifty years ago. The increase in raw material consumed accordingly, large as it is, does not show the whole increase in the business done. It is no doubt quite true that to all appearance there is no corresponding increase in the numbers employed in these particular industries. At the last census in England the numbers occupied in the textile manufactures appear to have been only fifty per cent. more than in 1841—963,000 compared with 604,000—while, as there is little increase of any kind between 1851 and 1881, and all the apparent increase is between 1841 and 1851, it may be doubted whether the increase, such as it is, is not apparent only and due to some change in classification in the former years.[1] But it is of the essence of progress such as has taken place that there should not be an increase of the numbers employed in the leading industries corresponding to the increase of production. The advance to the present time would not be what it is if

[1] See *Statistical Society's Journal*, June 1886, p. 357.

more were not produced by the same human agency. That the increase in the leading industries should be so enormous as it is, with so little increase in the numbers employed, tends to confirm the notion of a real increase in the things produced exceeding the increase in nominal values exhibited by the income tax assessments.

Of course it will be understood that none of these figures are presented as in any way conclusive. The increase in the leading industries, or in industries where machinery can be used, may be, and no doubt is, exceptionally great. The increase per head of other things is probably not so great. But as far as it goes, the evidence of the great increase of production in some directions confirms the idea that the average increase per head is a high one.

Progress of foreign trade.

It remains only to notice in this connection the development of English foreign trade, so important a part of the total industry. It is most easy in so doing to deal with the exports, especially as there are no good figures for the values of the imports before 1854. The exports, then, of British and Irish produce have increased between 1837 and the present time, from an average of about 45,000,000*l.* sterling, which had not been exceeded before that for any given quinquennial period, though there was a rapid increase immediately afterwards, to about 220,000,000*l.* at the present time—an increase of 400 per cent. Nor is this increase due in any way to an increase of the prices of certain leading articles. On the contrary, the prices of textile and other leading articles have rather declined, while the proportionate value of raw material imported contained in the articles exported appears also to have declined. The increase in particular items is in every way remarkable. The export of coal was about 1,000,000 tons only in 1837; now it is over 24,000,000 tons. The export of iron and steel was about 200,000 tons only; now it is over 3,000,000

tons. The export of cotton manufactures was about 600,000,000 yards, now about 4,500,000,000 yards; of cotton yarn formerly 100,000,000 lbs., now 260,000,000 lbs. The export of woollen and worsted manufactures was about 6,000,000*l.*, now about 18,000,000*l.*; while the increase in woollen yarn exported is from about 3,000,000 to 40,000,000 lbs. It would be useless to multiply items. In almost all there is an increase of quantity compared with which the increase of value, immense as it is, is hardly to be taken into account. As far as foreign export trade is concerned, the increase in business done is much more than the increase in the values representing them.

Turning to the imports, it is impossible, as already noticed, to go back before 1854 as regards values, since which date, however, the increase is from about 150,000,000*l.* to 400,000,000*l.* or about 165 per cent. With regard to quantities, as far as raw materials are concerned, what has been already stated as to the increased consumption in the leading textile manufactures may suffice. The amount consumed is necessarily the quantity imported less re-exports. With regard to food, again, the increase of the imports of articles consumed at home does not, of course, show the total increase of consumption, for which purpose it is necessary to compare the increased imports with the home consumption at starting. But the facts as to certain articles not in this ambiguous category can be stated. Thus sugar increases from about 4,000,000 to 20,000,000 cwts. or 400 per cent. Tea increases from about 35,000,000 lbs. to 180,000,000 lbs., also about 400 per cent. Tobacco increases from about 22,000,000 to 52,000,000 lbs. or about 135 per cent. There are other minor articles where the increase of the imports is less; but these are not unfair samples of the increase of the foreign import trade.

The figures as to shipping, which is itself an important

branch of the foreign trade, are quite as significant. The entries and clearances of shipping in the foreign trade averaged about 1837 very nearly 3,500,000 tons per annum each. Now the annual average is about 32,000,000 tons per annum, or nine times the figure of fifty years ago—an increase accordingly of 800 per cent. The increase in the mercantile marine of the United Kingdom, by which most of these entries and clearances in the foreign trade are effected, as well as a large amount of other work done, is equally remarkable. Fifty years ago (1840) the tonnage of vessels belonging to the United Kingdom was about 2,770,000 tons only. And this was a sailing tonnage only, the tonnage of steamers being only 88,000, a merely nominal quantity. Now the corresponding figures in round numbers are: sailing tonnage, 3,400,000 tons; steam tonnage, 4,000,000 tons; the equivalent of the whole in sailing tons, reckoning one ton of steam shipping as equal to four tons of sailing vessels, being very nearly 20,000,000 tons, so that the increase in the mercantile marine in the fifty years, measuring by efficiency, is about 600 per cent. Shipping.

The figures of the foreign trade accordingly fully confirm the idea that there is no increase of income tax values out of proportion to the increase in the things they represent. In certain directions at any rate, whatever the figures for the average of things in general may be, the increase in the things represented is enormously greater than the increase in money values.

It would be needless, accordingly, to multiply details. There is strong reason surely for concluding that the increase of wealth in the country during the past fifty years, when real things are taken into account as well as nominal values, is even more, and cannot well be less, than the increase in income tax assessments. General prices, as we

have seen, are lower and not higher than they were; the chief heads of increase in the income tax assessments are not mainly in connection with property where some increase of monopoly value has unduly swollen the valuation, but in connection with property subject to unlimited competition; the leading trades of the country all exhibit even a greater increase in business done than any increase in values—the increase in some cases, as in coal, iron, cotton, and shipping, and imports of tea and sugar, being truly marvellous. We have before us accordingly in all these figures with which we have been dealing, a real and not a merely nominal increase of incomes and wealth far beyond the increase of population. To repeat the general comparison already made—population has increased about 44 per cent. only; income and wealth over 100 per cent.; and income and wealth per head about 70 per cent.

Working-class progress.

The distribution of this vast increase of resources has also been for the benefit of the masses of the community. I have discussed this subject so recently in papers on 'The Progress of the Working Classes in the last Half-Century,' and 'Further Notes on the Progress of the Working Classes,'[1] that I may be permitted to refer to them specially, and only give here a brief summary of the argument.

The first point is, that as far as can be judged the number of income tax payers steadily increases. People having incomes below the income tax limit steadily pass into the class above. The only figures available for this comparison are those relating to the number of assessments under trades and professions, Schedule D, this being the only part of the income tax where there is a record of what is presumably individual incomes. Even here the record is not strictly of individual incomes, as partnerships may be included, but probably no great liability to error is

[1] See *Essays in Finance*, second series, pp. 365–474.

incurred on this account in using the figures. Now, what these figures show is that in England the number of such assessments over 150*l.* increased between 1843 and 1880 from 107,000 to 320,000, or about 200 per cent. in forty years. The increase of population in England alone, as we have seen, has been about 80 per cent. only in fifty years. Since 1880, to which the above table is brought down, there would seem to have been a further increase of no less than 7 per cent. in the number of the assessments under Schedule D; but a precise comparison, owing to changes in the limit of assessable income, can hardly be made.

The next point is that when the increase of money wages among the artisan classes is compared for apparently the same labour, a large increase is shown. In a table printed in one of the papers just referred to,[1] particulars are given of wages in sixteen instances, fifty years ago and at the present time, in all of which there is an increase for the most part ranging between 50 and 100 per cent. and in some cases exceeding the latter figure. The official records of seamen's wages beginning about 1850 show an increase of between 50 and 60 per cent. since that time. Similarly an estimate of wages at Manchester by Mr. Montgomery, President of the Manchester Statistical Society, brings out an average increase of wages in the neighbourhood amounting to 40 per cent. according to the method adopted by Mr. Montgomery, but really exceeding that average when the figures are properly examined. Other records of money wages tell the same tale. There are no doubt some cases where only a slight increase is shown, but the run of the average increase appears to exceed 50 per cent. A comparison as to agricultural labourers' wages and as to labourers' wages generally shows further, that in

[1] Page 372.

the case of the rudest labour the improvement is quite to the extent allowed for by Sir James Caird, or over 60 per cent.

And such an improvement in the cases described implies, under the circumstances of the changes in population in the United Kingdom in the last fifty years, a much greater average increase than 50 or 60 per cent. These changes have involved an immense substitution of artisan and highly paid labour for agricultural and other rude labour of the lowest type. The population of Ireland has actually diminished, while that of Great Britain has increased, and the artisan population of Great Britain has thus been largely substituted in the general count of the population for the half-starved peasantry of Ireland. In Great Britain, moreover, for many years the labourers so called, both agricultural and non-agricultural, have remained stationary. As artisan or skilled labour is more highly paid than unskilled, and as labour in Britain is far more highly paid than the labour of Ireland fifty years ago, it follows that an increase of anything like 50 per cent. in the money wages of artisan or factory labour in Great Britain implies an enormously greater increase in the money wages of the average masses now compared with the average masses fifty years ago. The proportion of the population receiving earnings of the higher class has largely increased, and the average amount of these earnings has itself increased.

Such is the general nature of the facts by which the increase of earnings among the masses of the community is demonstrated. If the facts are at all doubted, the doubts would appear to arise from a failure to appreciate what was the actual condition of the masses fifty years ago. But it would be impossible for the facts to be otherwise. When the facts of production and consumption are looked at, it is found that the exchanges of the community are mainly the

exchanges of the food, clothing, and articles of common luxury which the masses consume. Working men, in fact, exchange with each other, or the savings of the community are paid them as wages while they are engaged in adding to the fixed capital. There is no large proportion of general income consumed in useless luxury by a rich class. It would be a good thing for themselves if working men were the owners, more than they are, of a share of the accumulated wealth of the community, but the additional amount they would thereby be enabled to spend would be very small if they were to save as the present owners of the property save.

The final test of wellbeing is the increase of consumption by the masses. On this head what has been already said in another connection regarding the increased consumption of tea, sugar, and tobacco, should suffice. But some well-known figures may be repeated as to the consumption per head. The consumption of sugar in the fifty years has gone up from about 15 to 70 lbs. per head; tea from $1\frac{1}{4}$ to $4\frac{3}{4}$ lbs. per head; tobacco from 0·86 to 1·40 lbs. per head; and so on. There is also a remarkable improvement in houses. The annual value of houses above 10*l.* rental in Great Britain was 12,603,000*l.* only about fifty years ago; now it is over 57,000,000*l.* or between four and five times the total of fifty years ago. It has been contended by some working men or their friends that the increased rental of dwelling houses only shows increased expense: it is, they say, a drawback to the improvement shown by the rise in money wages. But the argument as to a real improvement being indicated is very strong. Either the increased rental is due to a rise in the cost of building houses—which would imply that working men connected with the building trades obtain largely increased wages—or it implies that more accommodation is provided; so that the masses are really

'consuming' more and better house accommodation per head than they did.

To the same effect are the figures showing decrease of pauperism, decrease of serious crime, increase of savings bank deposits, and increase of the funds of co-operative and building societies. The facts as to pauperism and crime, however, need not be more than hinted at, as not strictly belonging to the present subject. They are significant of a moral improvement in the population which need not have followed the material improvement, but which has, in fact, followed that improvement. With regard to savings banks the broad fact that need be mentioned is that the number of depositors has increased from about 430,000 fifty years ago (1831) to 5,200,000 at the present time, while the deposits have increased from 14,000,000*l.* to over 90,000,000*l.* As has been hinted already, saving is not the strong point of the masses of the United Kingdom. It may be doubted if they have saved proportionately as they ought to have done, considering what their increased earnings have been. But their condition absolutely in this as in other matters is better than it was.

There could be no greater mistake than to be content in such a question with a bald statement of figures merely. It remains only to add, therefore, that, according to the universal testimony of those who remember fifty years ago (and these are not few), the masses of the community are better fed, clothed, and housed than they were—immensely better. The fact of a great rise in the scale of living among all classes began to attract attention twenty years ago, and is in truth one of the notorious features of the economic history of the time. That a different impression has got about lately in some quarters appears to be due to an exaggerated impression of the relative mass of the residuum, which is not surprising when those who receive and

diffuse such impressions neglect to make use of the statistical method in dealing with facts where statistics are absolutely necessary. In a great community like that of England, even facts that are small relatively are likely to be large absolutely. It may well be, therefore, that there is a large residuum, and yet all the facts as to the masses generally, as here set forth, and which must be true, or no such progress of the nation in wealth could have taken place as what has in fact occurred, may also be true. There is no inconsistency between the two sets of facts. Only the residuum, though a big fact absolutely, is not really so very large when the great mass of the community is considered. The hope of dealing with it successfully, it may be added—though this is going a little out of my way—lies really in the fact that it is smaller relatively than it was, and that the nation is strong enough to feel its existence an opprobrium and a shame, and to grapple with it in a way it has never been grappled with before. How far the hope is well founded may be a question, for moral evils are peculiarly inveterate, but the nation is certainly not staggering under the nightmare of its residuum as it was staggering under the load of pauperism and connected evils fifty years ago. The evil is still great, but it is in every way more manageable.

Progress of the Colonial Empire.

It was pointed out at the commencement of this paper that, while it was intended to deal specially with the internal growth of the United Kingdom, the fact that this growth was really that of the centre of a mighty empire which had been growing at the same time, would not be overlooked. A glance at the development of British possessions in their economic aspect is therefore required in order to complete our survey.

It is difficult to realise how small in comparison with the present time were the beginnings of empire fifty years

ago. According to the statement in M'Culloch's statistical account of the Empire, published about fifty years ago,[1] the whole population of the British possessions, exclusive of India, was 3,684,000, or in round figures just under 4,000,000. The population of North America was about 1,250,000 only; of the West Indies and British Guiana, 784,000; of Ceylon, just over 1,000,000; of the Cape, 131,000; and of Australia and New Zealand, about 100,000 only. The population of British India was reckoned at not more than 83,000,000; of British India with allies and tributary states at 123,000,000; and of all India at about 134,000,000. There may have been some under-estimate in the latter figures, but not much, I believe, allowing for the increase of population which must have been going on in the fifty years. The whole of the gross revenues of India were then no more than 22,000,000*l.*, and those of the rest of the Empire must have been quite inconsiderable. And the trade of the United Kingdom with all these possessions, excluding India, was represented by an export of only 12,000,000*l.* annually, and by entries and clearances of shipping amounting to about 900,000 tons each per annum. The exports to India were under 4,000,000*l.*, and the entries and clearances of shipping about 200,000 tons only.

Such was the British Empire economically fifty years ago. Now the population of the possessions exclusive of India has grown to about 16,000,000. Australia and New Zealand, which hardly counted before, have now a population of just about 4,000,000. The North American States have grown from 1,250,000 to 5,000,000. The West Indies and British Guiana count for 1,750,000 instead of 784,000 only. Ceylon has grown from 1,250,000 to 2,750,000. The Cape of Good Hope and Natal have nearly 2,000,000. On all sides there is immense development, all the more

[1] See vol. ii. pp. 518–521.

remarkable because so much of the increase of population, being in Australia and Canada, is the increase of the British race. In addition to the vast increase of a well-to-do population at home, there has been this addition of at least 8,000,000 to the British race in British possessions abroad; strictly speaking, therefore, an addition to the governing race and nucleus of the Empire. The Empire in India at the same time has mightily developed. The population of British India is now over 200,000,000, and of dependent India 55,000,000 and more, making a grand total of 260,000,000. India, in fact, in population is about double what it was, and four-fifths of the numbers are directly under British rule. The trade of the United Kingdom with this Colonial Empire has lately all but reached 100,000,000*l.* of imports and 90,000,000*l.* of exports per annum, the latter almost entirely exports of British and Irish produce, and seven times the amount of fifty years ago. The entries and clearances of shipping at ports in the United Kingdom in this great trade amount to about 4,000,000 and 6,000,000 tons respectively per annum, or five times the former figure.

The accounts of the possessions themselves show the growth of the resources in a still more striking manner. The aggregate annual revenue of these possessions exclusive of India may be put at nearly 45,000,000*l.* sterling per annum, as compared with an amount almost imperceptible fifty years ago. In Australia, which did not count then at all, the gross annual revenue is now about 22,000,000*l.* In North America it is 7,000,000*l.* That of the Cape is over 7,000,000*l.* And so of other colonies. The amounts include borrowing to some extent and sales of land, which are an equivalent process, but the deductions on this head would not alter the fact that there is an immense increase of real revenue.

The revenue of India, again, instead of being 22,000,000*l.* only, is over 70,000,000*l.*; and even making a deduction for the fall in value of the rupee, the amount would still be enormous.

The revenue of the Empire, in fact, outside the United Kingdom is thus over 100,000,000*l.* sterling, or more than the revenue of the United Kingdom itself, excluding local revenues. It is to be feared the burden of taxation is greater than in the United Kingdom. The resources are not really greater, although the taxation is more. But the fact of so huge a revenue being raised within the Empire, outside the United Kingdom, and that it is mainly the creation of the last fifty years, ought to give some idea of the economic growth of the Empire itself. The Empire outside the United Kingdom might constitute a State only second in power and resources to the United Kingdom itself. The aggregate foreign trade of this Empire has also grown to be enormous. The trade with the United Kingdom, as we have seen, is about 190,000,000*l.* sterling, imports and exports together, according to the United Kingdom figures, which agree fairly well with those of the colonies and India; but the whole foreign trade of this outer Empire is almost exactly double, the imports being about 200,000,000*l.* and the exports about 220,000,000*l.* In foreign trade the colonies and India together rank nearly second to the United Kingdom itself, and among the leading commercial States of the world, France, Germany, and the United States.

Summary and conclusion.

To sum up this long review. Through times and seasons not altogether free from difficulty, and in spite of some great economic disasters, of which the Irish famine may be reckoned the chief, the English nation at home and abroad has progressed in wealth and resources in the last fifty years in a most marvellous manner. At home it has increased in numbers between forty and fifty per cent., and

the increase has been mainly of a sort to imply a great improvement in industrial quality. Fifty years ago one-third of the people very nearly were in Ireland, for the most part in a state of semi-starvation. Now this third has become little more than an eighth, and in absolute numbers it has diminished from 8,000,000 to 5,000,000. The increase of population has not only been exclusively in Great Britain, but the increase there makes up as well for the loss in Ireland. At the same time in Great Britain itself the number of unskilled labourers has been stationary or declining. The increase of the people has thus been mostly an increase among the classes of skilled artisans and factory operatives. As the result, not only is there a great increase of population, but the units of the present 37,000,000, to which the numbers have grown, are on the average far superior in industrial quality to their predecessors of half a century ago. The resulting increase of wealth and resources is enormous. Taking income tax assessments as a test, it is found that the increase is from about 270,000,000*l.* to 630,000,000*l.* sterling, or an increase in all of 360,000,000*l.* or 133 per cent. Making a rough computation from this income, so as to arrive at a sum representing the property of the people, the property is found to have increased as from 4,050,000,000*l.* to 9,450,000,000*l.* sterling. The increase of income, according to this mode of calculation, is from about 10*l.* to 17*l.* per head, and of capital from about 150*l.* to 256*l.* per head—about 70 per cent. increase. Reasons have been given for the belief that the nominal increase thus shown corresponds to and does not exceed what the increase in real wealth would be if units of quantity could be substituted for units of value. There has been no rise of prices, but rather the reverse. In the production of coal and iron, the consumption of raw material in the leading textile manufactures, and the growth of the foreign trade

and shipping, the increase of quantities produced and consumed comes out as a rule many times greater than the increase of nominal values shown by the income tax returns and the calculations based on them. Of course such figures only supply data for approximating to the final result, but they leave little doubt that in whatever directions labour has been stationary in its product, yet on balance there has been a great increase, which probably exceeds the increase of 70 per cent. per head in the income tax assessments. There is reason to believe, moreover, on independent evidence—on the evidence of increased money wages and the increased consumption of articles of food, clothing, and common luxury—that the masses of the community have improved in their condition in a manner corresponding to the increase of the general community in resources. The national revenue has improved in a similar manner. Fifty years ago the sum of 60,000,000*l.* annually was levied with difficulty by Parliament, and there was a chronic deficit. At the present time 90,000,000*l.* are raised with ease by means of taxes which have been greatly diminished, the nett remission in the fifty years having been in fact 21,000,000*l.* sterling, while the diminished sources of revenue bring in 30,000,000*l.* more money than the undiminished resources formerly did, and while it is also plain that if the repealed and remitted taxation were now to be reimposed the annual yield would exceed greatly what appeared to be given away. *Per contra*, the local burdens have increased by an amount equal to twice the local taxes of fifty years ago, viz. by the sum of 30,000,000*l.*; but this is no complete set-off to the improvement in the imperial revenue, while there has been no increase in the rate even of this local taxation, so great has been the increase of property, and the bulk of it really represents beneficial expenditure on the local property itself.

While this internal growth has been going on, the growth of the Empire outside the United Kingdom in economic resources has been hardly less marvellous. Apart from India, colonial population has grown from 4,000,000 to 16,000,000, and the British race included in these figures from about 1,000,000 to over 9,000,000; so that in addition to the 37,000,000 to which we have grown at home, there falls to be joined another section of the governing race abroad, amounting to over 9,000,000, and almost all an addition to the governing nucleus within the last fifty years. India at the same time has nearly doubled its population, the total being now about 260,000,000, of which four-fifths, or nearly so, are under direct British rule. In revenue this outer Empire, exclusive of India, raises no less a sum than 45,000,000*l.* annually, which is almost entirely new revenue, while Indian revenue itself has grown from 22,000,000*l.* to 70,000,000*l.* In foreign trade, which was quite inconsiderable fifty years ago, there has been just as wonderful a transformation. The imports are now about 200,000,000*l.* and the exports 220,000,000*l.* sterling annually. This outer State, therefore, if we could look upon it as a whole, is by itself quite equal in every way to one of the great States of the world. Commercially and politically it might rank with the very first States—with the United Kingdom by itself; with France, with Germany, with the United States; and *before* Powers like Russia, Austria, Hungary, and Italy; and it is almost all the growth of the last fifty years. Putting the United Kingdom and its colonies together, we are probably safe in affirming that never at any past time, nor in the present century of economic marvels, has there been so astonishing a growth.

It is impossible not to put the question, What are the conditions, as to probable permanency and continuance

or the reverse, of this stupendous growth? Putting aside the discussion of any political circumstances, I should be disposed to reply that, economically, I perceive no conclusive circumstances against either permanency or continuance. It is true that the prosperity—at least at home—is not rooted in a highly prosperous agriculture in a way that economists like Arthur Young considered all-important; that the United States and not England is now *par excellence* the agricultural country. Experience, however, has shown that a country may now possess a vigorous people and a progressive industry, although it imports much food and raw materials from abroad—that such a country is no more dependent economically on the people from whom it imports than these people are on the country to which they sell. The dependence is mutual in the strictest sense of the word. The real estate of the English people consists now in their superior industrial quality; in their skill and enterprise; in their acquired capital; in their established system of credit; in their huge investments abroad, which insure them, as compared with foreign nations, the free possession of much food and raw material to start with. With such an estate, and no doubt also with coal and iron as yet in ample profusion, there seems no reason why the English race should not advance steadily for many years to come. It will be their own fault if they fold their hands and permit themselves to fall behind. These things are specially true of the Colonial Empire. The room for development in India and other subject colonies is endless. Nothing has been more remarkable of late years than the swift growth of India's foreign trade. As regards English-speaking colonies, again, here there is at least no lack of agricultural wealth to form the basis of general prosperity. The Empire as a whole, in this matter, though not the United Kingdom by itself, may come up to

Arthur Young's test of a prosperous agriculture as the basis of all prosperity. As the English-speaking colonies grow faster relatively than the United Kingdom, this element cannot fail to grow in importance, whether it is necessary or not to the general prosperity.

It may be admitted, however, that there are clouds on the horizon—at least, what are supposed to be clouds. A great deal has been heard in recent years, for instance, as to foreign competition threatening our commercial supremacy. But this particular cloud, in the face of the past history and the broad facts we have been dealing with, cannot be considered very threatening. It has been heard of a great deal at any time during the last fifty years, if not for a long period before, yet English foreign trade advances all the same in the way we have seen. The truth is that in this matter an ounce of common sense is worth tons of pamphlets by British trade revivers, and reciprocitarians, *et hoc genus omne*. No amount of foreign competition can really hurt an industrious and vigorous community. If the foreigner who competes with us is really superior, he will command a higher wage; if he is equal only, he will command the same wage. The fact that he is industrious does not take anything from us—it only affects the rate of exchange between him and ourselves. It is quite certain that foreign manufacturing and foreign competition must increase. No power can prevent it. But the competition from which individual traders suffer and against which they exclaim is only the means after all by which exchanges are made. In reality a prosperous foreign growth should be a cause of gain and not loss to an industrial community like England.

I should be disposed to attach more importance to a certain supineness and languor which appear to be creeping in at some points. At one time, and I trust still with only

a few exceptions, English commerce had the reputation of being democratic. Englishmen had 'go' for any enterprise, and the facilities for credit were such that young and pushing men could always obtain needful capital. Now it would seem there is less push and 'go,' or less push and 'go' relatively to what is required. Germans, it is complained, are doing the hard work of foreign commerce everywhere, and crowding out or taking the place of young Englishmen, who do not in fact compete. English merchants at home, instead of buckling to hard work, complain of foreign bounties and foreign tariffs, and move heaven and earth to help them instead of helping themselves. And if the facts are according to this statement to any extent, then English commercial decadence is at hand. Of course they are not all true generally, but there is enough truth in them, perhaps, to justify an appeal to all who have influence over youth against the indolence and shirking of disagreeables which are too apt to grow up with the possession of assured wealth. This is the real danger which a wealthy society runs the risk of. All concerned—merchants and workmen together—are tempted to take life too easily, in shorter hours, many holidays, and extravagant living. Shorter hours and holidays and high expenditure can only be justified, however, by increased energy and skill in actual work. The production must continue in some form if the wealth is not to be lost.

It is also a drawback to the position of the United Kingdom and of the Empire generally, that, however great the advance has been, other nations would seem to have been relatively gaining on us. This would seem to be especially true of the United States. Fifty years ago the United States were a nation inferior in numbers to the United Kingdom. They were little more than 15,000,000 of people as compared with nearly 26,000,000 in the United

Kingdom. Now they are 60,000,000—greater than we are by numbers nearly equal to our total population fifty years ago. The United States people, moreover, are increasing rapidly in manufacturing as well as in agricultural resources. Germany is another country which has also advanced rapidly in the last fifty years. Altogether the world outside England is becoming greater relatively than it was; and although the balance is redressed a little when we take our Colonial Empire into account, still it is not completely redressed.

In this way, it is said, English commercial 'predominance' is threatened. But it may be pointed out that this is no real cloud. Predominance is not prosperity. The growth of a country like the United States, so full of wealth and resources of every kind, should in truth conduce to and not injure other countries. Why should it injure them? Its wealth makes it naturally a better customer than before; however Protectionist its leanings, it cannot sell abroad without buying. Very possibly, therefore, within the next generation or two, the United States may be greater commercially and industrially than the United Kingdom, or even than the whole British Empire. But Kingdom and Empire may both flourish exceedingly, though predominance is gone.

I may add, too, though this is hardly the place to discuss the point, that though English predominance is now threatened, still even here the end is not yet, and it is not so certain what will really happen. The United States is approaching a more difficult time economically than the people there have yet had to face. The special attraction of the country to emigrants in the existence of an immense area of virgin soil, on which an extensive agriculture could be practised, will soon be lost. Possibly under the new conditions the attraction of people will be towards the older and more crowded communities just because these are the

best places for developing and carrying on manufacturing skill, and it is no longer necessary for people to live where their food and raw materials are grown.

In the midst, then, of the great economic changes impending, and which will probably render the next fifty years even more interesting and dramatic than the last fifty, and in which there will probably be witnessed an even greater advance in wealth and resources among the nations of the world than what has just occurred, it must not be assumed that the foremost place, in spite of some appearances to the contrary, will not remain to the United Kingdom or to the Empire. We have many things in our favour, including acquired position and accumulated wealth, though there is also much against us. In any case, if the nation is true to itself, greatness and prosperity are assured, although a kindred people may possibly advance even more rapidly than we shall do ourselves.

R. GIFFEN.

INDUSTRIAL ASSOCIATION.

THE Victorian era has been remarkable in many respects, but in no respect has it been more remarkable than in the development of associative effort for mutual protection and support amongst the masses of the people. It is perfectly true that this movement began long before the commencement of her Majesty's reign, but its progress was fitful and slow; it was hampered by prohibitory laws, and was regarded with suspicion by the wealthy and trading classes. The law not only did not foster and encourage the spirit of self-help and self-reliance among the people, but strove to repress the earlier beginnings of real associative effort; and when its growth could no longer be resisted, nor its aspirations stifled, legislators hampered it by what they were pleased to call safeguards, lest it should end in 'revolutionising society,' and in destroying the 'fabric of the State.'

Restrictive laws before 1837.

Before we proceed to enumerate the character and objects of the various efforts to ameliorate their condition by the people themselves, it will be well to consider the state of the law as regards combination and association; and, also, the actual condition of the people, because the latter was, to a considerable extent, the outcome of restrictive law—the State would not help the masses, and rendered it difficult for them to help themselves, The 'old combination laws' had, indeed, been repealed, by the 5th Geo. IV. c. 95; but such was the 'timidity of capital,' or rather of capitalists,

that this Act was in its turn repealed in the following year, 1825. No sooner had the former Act been passed than an outcry arose that the combinations of workmen were ruining the country, and a demand was made for the re-enactment of the repealed statutes. A Committee of Inquiry was appointed, and took evidence, the result being that the accusations were disproven; but in order to allay the clamour the Act of 1824 was repealed, and another, the 6th Geo. IV. c. 129, was substituted in its place. The weight of evidence was so overwhelmingly in favour of the repeal of the old statutes that every one of those mentioned in the Act of 1824 was repealed, but some modifications were made in the body of the new Act, in the interest of the masters, which led to further agitation for its repeal. Slight as the alteration was, it was sufficient to hamper the action of the workmen in their efforts to combine, and subsequent prosecutions showed that a new engine of repression was in reserve in the shape of the conspiracy laws.

Nor was this all. The Corresponding Societies and the Licensing of Reading-rooms Act, 39 Geo. III. c. 79; the 41 Geo. III. c. 30, 'An Act for the more effectually Preventing Seditious Meetings and Assemblies,' reviving the 36 Geo. III. c. 8 for a limited period only, but which remained on the Statute-book until repealed in 1872, and numerous other statutes or parts of statutes, were used as instruments to prevent combination even after the so-called 'repeal of the combination laws' in 1824 and 1825. Many of those enactments were primarily directed against political meetings and societies, and the late Sir Thomas Erskine May says of them: 'The series of repressive measures was now complete. We cannot review them without sadness.'[1] A new form of suppression was discovered and applied to combinations of workmen in 1834. A few

[1] *Constitutional History of England*, ii. 330.

Dorchester labourers met and formed themselves into a society. Acting upon the old guild method of association, recognised by the law as perfectly legal for centuries, these men bound themselves together by a declaration to stand by and support each other in the endeavour to better their condition. A prosecution was instituted under the Unlawful Oaths Act, and six of them were sentenced to transportation. They were subsequently reprieved, but the fact was never communicated to them, and several were detained for years in a penal settlement, and one of them only read of his reprieve by accident in the Governor's house, in an old newspaper, while waiting for an answer to a letter he had brought from his master.

Prosecutions under the conspiracy laws were frequent and disastrous. Even when the prosecutors could not obtain a verdict—and they very often failed to do so—the men were ruined by the costliness of the prosecution, and the societies to which they belonged were crippled for years, and often altogether broken up. If conviction did not follow, men were terror-stricken at the prospect of a criminal prosecution before a hostile judge and a prejudiced jury, and often these men were driven into secret combination, because the law would not recognise the legal right to combine. The strong feeling entertained by the governing classes against combinations at that period was made still stronger by the preamble of the very measure which purported to render them legal. In the preamble to the Act of 1825 it is recited: 'Whereas such combinations are injurious to trade and commerce, dangerous to the tranquillity of the country, and especially prejudicial to the interests of all who are concerned in them,' &c. This expression of opinion on the part of the Legislature influenced judge, jury, and prosecutors in their efforts to put down combinations of all sorts on the part of the workpeople.

Prosecutions after 1837.

Many of the worst forms of persecution, carried on in the name of law, under the guise of criminal prosecution, took place prior to the accession of her Majesty; but they were continued for years after her coronation, or a reference to them would scarcely come within the scope of this chapter, except as showing that the influence of bad laws continues to operate powerfully even after their repeal. In the year when her Majesty ascended the throne there was a strike in Glasgow, involving great suffering. In the previous year the masters had counselled a strike against one wealthy manufacturer, because he refused to accede to the terms agreed upon mutually by all the other masters. The men failed. The other masters then demanded a reduction of from 57 to 58 per cent. The men resisted; five were prosecuted and convicted, and sentenced to seven years' transportation for 'conspiracy and illegal combination.' The matter was brought before the House of Commons, and an inquiry was instituted into the operation of the Act 6 Geo. IV. c. 129 in 1838; some very valuable information was elicited, by no means disparaging to the workpeople, and the Committee separated without making any formal report. But this one point came out clearly, namely that 'the effect of the repeal of the combination laws upon the conduct of strikes had been generally beneficial.' The majority of the masters admitted the superiority of the union workmen over the non-union workmen, and declared that 'the combinations had no effect upon wages.'

In the years 1847 and 1848 some very disastrous prosecutions were instituted; in one instance several men were sentenced to ten years' transportation at Sheffield, but on taking the case to a higher court the judgment was reversed. The defence of the workmen thus prosecuted cost a vast sum of money—in three cases alone the costs amounted to 7,658*l.* 9*s.* It will thus be seen that 'the repeal of the

combination laws' did not render combinations lawful, nor were they made lawful until the year 1875. One other point requires illustration: Nominally the law made it legal to combine; but the funds of the associated members were unprotected until the passing of a temporary Act in 1869, made permanent by the Trade Union Act in 1871. The Masters and Servants Acts also impeded free combination, for under them men were nominally prosecuted for one offence, but practically convicted and sentenced for another. There was in reality no freedom of contract for workpeople, no lawful right to combine, and no protection of their associated funds. And, moreover, every associative effort was regarded with suspicion, even when not openly opposed.

State of the working classes, 1837-50.

Though it is easy to conceive the pitiful and even degraded condition to which the working classes were reduced from having no real power of peaceable combination under the protection of the law, few persons seem to be aware of the intensity of their suffering, the prolonged privation which they endured, and the distress which everywhere prevailed. The impetus given to commerce and trade by new inventions only intensified their misery. They saw their handicrafts supplanted by self-acting machines, and in the depths of their desperation they wreaked their vengeance upon the machinery which they thought would supplant them. These men saw only the misery of their wretched homes, the pinched faces of their starving wives and children; and impelled by hunger, angered by injustice, driven almost to madness by penal laws, they broke out into rioting, to be dispersed by the military, their leaders imprisoned, and themselves and families driven into the workhouses of the country.

It is not possible with a few strokes of the pen to describe the famished and wretched condition of the people

—the workers at the looms, in the mines, in the fields, in all branches of industry during the earlier years of her Majesty's reign. With exceptions, the same description is equally applicable during the whole of the first thirteen years of the Victorian era. Very little real progress was made until 1850; since which date the material condition of the people has sensibly improved. During the intervening years, 1837 to 1850, what was there to brighten the outlook, what to render the workers contented and happy? From 1837 to 1845 we have fairly ample evidence as to the condition of some of the larger sections of the working classes. This was the period of inquiry. The more important inquiries instituted in that period were: By 'the Select Committee on Combinations of Workmen,' 1838; 'Commission to inquire into the Physical and Moral Condition of Children and Young Persons employed in Mines and Manufactures,' 1840 and 1841; 'Reports on the Sanitary Condition of the Labouring Population of Great Britain,' and 'the Local Reports for England and Wales, and for Scotland' (1839–43, 4 vols.), and the 'Report of the Commission to inquire into the Condition of the Framework Knitters,' with appendices, 1845, one thick volume of 1,053 pages. There were other reports which shed a side-light upon the various subjects more particularly dealt with in the foregoing, such as the inquiries of the Poor Law Board; reports on the training of pauper children, and on education, issued by the Committee of Council; and contemporary historians, pamphleteers, and the authors of memoirs and autobiographies, covering this period.

Reports of Commissions.

Long extracts might be taken from various authentic sources sufficient to fill a volume, but a condensed account will suffice for present purposes. Taking the records in the order of date, what do we find? Speaking upon the relative wages paid in 1837–38, Mr. David McWilliams, in answer

to this question, 'Do you find that, while more is spun every year, the wages of the men are increasing every year?' replied: 'I find them to be decreasing every year, though the labour is increasing alarmingly.'[1]

Question 2848, Mr. O'Connell: 'The hand-loom weavers are in great distress?' Answer, Mr. Jemmill: 'They are always in distress; they are paid the lowest possible wages.' Replying as to the wages of piecers, he said that they were paid 2*s.* 6*d.* a week, or 3*s.* a week, or 3*s.* 6*d.* per week, according to the size and efficiency of the boy or girl. Further on he said: 'I can state with confidence that the families of the hand-loom weavers are in general wretched in the extreme, being ill-clad and ill-fed.' The conduct of the workmen usually Mr. Jemmill considered good.

Mines.

In the Report on the Employment of Women and Children in Mines and Manufactures the Commissioners say: 'We find that instances occur in which children are taken into these coal mines to work as early as four years of age, sometimes at five, and between five and six, not unfrequently between six and seven, and often from seven to eight, while from eight to nine is the ordinary age at which employment in these mines commences.' 'That in several districts female children begin to work in these (coal) mines at the same early age as the males.' 'The nature of the employment requires that the youngest children should be in the pit as soon as the day commences, and that they should not leave the pit till the work of the day is at an end.' 'They are excluded from the light, and are always without companions, and were it not for the passing and repassing of coal carriages, it would amount to solitary confinement.' 'Many of them never see the light of day for weeks together.' 'From six years old and upwards the hard work of pushing and dragging the carriages of coal from the work-

[1] *Report on Combinations of Workmen*, 1838, Question 3733, p. 275.

ings to the main ways, or to the foot of the shaft, a labour which requires the unremitting exertion of all the physical powers which the young workers possess.' Extracts in abundance might be given from the evidence, in proof of each of the foregoing statements, but space forbids. The whole report is well worthy of careful perusal, for its facts as well as for its conclusions. 'In Scotland the children, mostly girls, carry the coals on their backs up steep ladders.'

One more paragraph in this famous report must be quoted in full, as it tells its own sad tale: 'In the districts in which females are taken down into the coal mines, both sexes are employed together in precisely the same kind of labour, and work for the same number of hours; the girls and boys, and the young men and young women, and even married women and women with child, commonly work almost naked, and the men, in many mines, quite naked; and all classes of witnesses bear testimony to the demoralising influence of the employment of females underground.' This revelation so shocked the feelings of all right-minded people, that the first Act which was passed prohibited females working underground any longer. The testimony as to food and rest, especially of the poor children, is terribly sad. 'I have known boys work the whole twelve hours without more than a bit of dry bread to eat,' says one witness, and the testimony of many others is to the same effect. One more extract from the evidence: 'They have a little milk or a little coffee and a bit of bread in the morning before they go to the pit, and they will take nothing with them but a little bread, and perhaps a little tea, but oftener dry bread than anything else. Their parents cannot often get them more. They do not have meat. The parents do not get wages enough to provide meat for the children.'

Factories.

The terrible condition of the factory workers, especially the women and children, was scarcely better. Their wages

were at starvation point, and their physical energies were exhausted before they had arrived at the age of manhood or womanhood. Poor, crippled, and deformed, existence was a struggle, and a hard one, without cessation, and without hope. No wonder that there was destruction of machinery, rick-burning, rioting—it was the outburst of despair.

The hosiery trade.

But of all the depressed and suffering industries of the country, there was none in which the suffering was so severe and continuous as in the hosiery trade of the midland counties. The principal manufacture of the counties of Leicester, Nottingham, and South Derbyshire, was framework knitting. Men and women worked the hand-looms in their own cottages, the children of the family assisting in winding, seaming, and other auxiliary processes. When fully employed the entire earnings of a family were hardly sufficient to provide the barest necessaries of life. Mr. Felkin, whose excellent 'History of the Machine-wrought Hosiery and Lace Manufacture' affords the most complete and authentic record of this great industry, thus describes their condition: 'We do not hesitate to affirm that the actual sufferings and privation experienced during the so-called Lancashire famine of 1863–66 were far less than the distress in the midland hosiery district during the interval between 1810 and 1845; where it became a long and widely spread practice to still the cravings of hunger in the adult by opium taken in a solid form, and by children in that of Godfrey's cordial.' The earnings of a man fully employed would range from 5*s.* to 7*s.* 6*d.* per [illegible]ek; women worked hard to earn half this sum. The [illegible]ratives were in number so far in excess of the demand [illegible]their labour, that their condition may be described as [illegible]*f chronic lack of employment and chronic hunger.* [illegible]wellings 'were for the most part filthy, and the Their d[illegible]

abodes of discontent and misery. The children had no scholastic education at all.'

The frightful misery endured by these wretched people, estimated upon a careful census to number 100,000 souls, was frequently the subject of parliamentary discussion and legislation. There are blue-books on the subject as recent as 1845, describing a state of things so appalling and so dangerous that it is almost impossible to credit the established facts. A stranger visiting to-day the handsome and flourishing towns of Leicester and Nottingham can never realise the squalor, misery, and discontent of which they were the centres forty or fifty years ago. We fear to portray them, lest our description should seem exaggerated. A perusal of the blue-books and of the careful historian we have cited, will, however, satisfy the student that the sufferings of the Midlands framework-knitters cannot be overstated.

It is not surprising that a population enduring such privation and misery should be often turbulent and always discontented. From 1810 to 1816 Luddism—machine-breaking—prevailed throughout the Midlands, and Parliament enacted that this crime should be punishable with death. In 1816 six men were executed at Leicester for frame-breaking, in the presence of 15,000 people. They died with the firmness and courage of heroes, and were regarded as martyrs by the sympathising spectators. Bread riots were not unfrequent in the towns down to 1848. Strikes accompanied with outrage were common. Misery and discontent went hand in hand, and the relations betwixt employer and employed were probably more embittered than in any other industry. Thomas Cooper, in his au[illegible] biography, relates that in 1841 in the town of Leicester [illegible] witnessed suffering more intense and hatred of employ[illegible] more fierce than anything he had experienced else[illegible] before or since that time.

The legislation fostering, developing, and guiding associative effort may be divided into two classes: the first group comprising the Factory and Workshops Acts, the Mines Acts, and similar enactments, designated by Mr. J. M. Ludlow as 'Protective Law;' and the second group, comprising the Friendly Societies Acts and similar enactments, designated by the same authority as 'Enabling Law.' A brief outline of each class is all that can here be given.

Protective Law: (a) The Factory Acts.

The earliest Act of this class dates back to 1802, but it was very circumscribed in its character, as foreshadowed in its title, viz.: 'An Act for the Preservation of the Health and Morals of Apprentices and others employed in Cotton and other Factories.' Nevertheless it laid the foundation for all subsequent legislation, and the promoters of it set in motion a piece of legislative machinery which would be more and more perfected as time went on, until it had effected a complete revolution in the mode of conducting work in the factories and workshops of the world.

Further legislation was attempted in 1818, 1825, and 1831, but it proved abortive, and the evils it was intended to remedy having been shown to be vastly extending, a pitiful cry went up from the crushed and distressed operatives for further protection, such as the law only could give. Fortunately for the operatives, they were not left to struggle alone with the growing abuses of the factory system. Among the first to come to their assistance was a wealthy manufacturer in Bradford and a thoroughly Christian man. It was John Wood, of Horton Hall, Yorkshire, who first called the attention of Richard Oastler to 'the factory system and cruelties in mills.' 'Cruelties in mills!' exclaimed Richard Oastler; 'I do not understand you; tell me.' Mr. Wood told him all he knew. Richard Oastler was deeply impressed, and on the morrow, early, Mr. Wood

sent for Oastler and said: 'I have had no sleep to-night; I have been reading this book (an open Bible), and in every page I have read my own condemnation. I cannot allow you to leave me without a pledge that you will use all your influence in endeavouring to remove from our factory system the cruelties which are regularly practised in our mills.' The pledge was given, and Richard Oastler's name will be for ever identified with the earlier movements of the factory workers in their efforts to obtain the protection of the law.

The first outcome of this solemn compact was a letter, dated September 29, 1830, published in the 'Leeds Mercury,' signed Richard Oastler, the editors having refused to publish it without his full name and address, his first intention being to sign it 'A Briton' only. This letter evoked a storm of abuse, and also much sympathy. On November 22, within two months of the letter appearing, a numerous meeting was held at the Talbot Inn, Bradford, convened by twenty-three of the principal firms in that town, 'for the purpose of promoting a legislative enactment to diminish the hours of labour in worsted mills, and to effect other regulations connected therewith.' This influential meeting unanimously condemned the long hours, and admitted fully the evils of the unregulated factory system; at the same time the gentlemen present gave good reasons why, *individually*, they had not been able of themselves to effect a remedy. From this date the agitation took a definite form; the factory operatives hailed the movement with exclamations of joy; the press approved the action taken and fostered it; and many manufacturers and other wealthy persons rendered assistance in bringing the matter before the public and the Legislature. Some of the cotton manufacturers of Lancashire also expressed themselves favourable to further legislation; but a number of mill-

owners in and around Halifax met and determined to oppose all further legislation, embodying their views and determination in a series of fourteen resolutions. A formidable contest was now inevitable, and the Bill promised by Sir John Cam Hobhouse and Lord Morpeth when issued was found to be so emasculated as to be worthless.

Out of this fierce antagonism arose the agitation for the 'Ten Hours a Day and a Time-book Bill,' inaugurated at Huddersfield by a compact between Mr. Richard Oastler and the working men of that town. Mr. Michael Thomas Sadler now became the parliamentary champion, in the place of Sir John Cam Hobhouse, and he introduced a measure in the autumn of 1831 (December 15). On March 16, 1832, the Bill was read a second time, on which day the late Lord Macaulay gave in his adhesion to the measure, in a letter to Mr. Ralph Taylor, the Secretary of the Leeds Short-Time Committee. The Bill was referred to a Select Committee, composed of gentlemen of wide experience and broad views and much ability; it was perhaps the most influential and impartial that could have been selected, and it was a large committee, so impressed was the House of Commons with the importance of the subject.

Meetings were now held in all the chief manufacturing centres likely to be affected by the provisions of the measure. The largest and most impressive was held in York on April 24, 1832. Tens of thousands of men, women, and children marched to the Castle-yard, some thousands of them a distance of from twenty-four to, in some instances it is said, thirty miles to be present at the gathering. The weary march home, amid pelting torrents of rain, on that memorable day, is one of the many touching incidents in the history of this agitation.

The evidence taken before the Select Committee disclosed a state of things sad and terrible in the extreme.

Women were chosen for wives, not for any high quality or attribute of womanhood, but for their fecundity. The reasons are obvious: women and children had become the breadwinners, children kept their parents, while the men had sunk to be mere loafers at the doors of public-houses, or were engaged in some of the brutal 'sports' then prevalent among all classes of the people. Women and children were employed from 5 o'clock in the morning until 9, 10, 11, and sometimes 12 o'clock at night. The sexes were so herded together that all sense of shame and decency became obliterated. Medical testimony showed that the children were physically ruined by overwork, long hours, and exposure; that their food was insufficient in quantity and wretched in quality; the ventilation was bad, the atmosphere was vitiated, and many were so maimed and crippled that at an early age they became paupers.

In the general election of 1832, Mr. Michael Thomas Sadler lost his seat, and the late Lord Shaftesbury, then Lord Ashley, became parliamentary leader of the 'Ten Hours' movement. His first effort in the House of Commons was frustrated by the common device of a Royal Commission. The evidence collected by this Commission corroborated in every essential particular the evidence given before the Sadler Committee. The concluding paragraph of the report was as follows: 'We are therefore of opinion that a case is made out for the interference of the Legislature in behalf of the children employed in factories.' After many vicissitudes a measure was passed, the 3 and 4 William IV. c. 103; but the leaders of the Ten Hours Bill repudiated the measure altogether. The Act was not to come into full operation until 1836, before which time another Act, explanatory of the foregoing, was passed, the 4 and 5 William IV. c. 1. The late Lord Shaftesbury had declared that 'the Government Bill would prove imprac-

ticable and unsatisfactory,' and he asked, 'Was the House prepared to say that a master manufacturer might send his waggon to any part of the country for a load of children like so many hogs, and bring them away from their natural protectors, to place them unprotected among strangers?' The full meaning of this far-reaching question was not apprehended at the time, but its force soon became apparent after the passing of the 'New Poor Law Amendment Act, 1834.' Lord Shaftesbury saw farther than most men on that occasion.

One of the basest conspiracies upon record was now organised in order to defeat an honestly intended though inadequate measure of reform. Some mill-owners endeavoured to use the Poor Law Act as a means of attracting large numbers of children from the rural and urban to the factory districts. The Poor Law Commissioners fell into the trap and encouraged migration. The appendices to the Poor Law Reports of 1835 afford ample evidence as to the working of the system, and furnish an insight into the mode and character of its operation. In the year 1837 it began to bear its natural fruit. The sufferings of the labouring men, women, and children imported into the manufacturing districts may be seen detailed in the accounts rendered by the Manchester agent to the Poor Law Commissioners. The facts brought to light explain the reason why the supporters of the factory movement opposed the New Poor Law. Mr. Oastler says: 'It was in evidence that the New Poor Law was intended to perpetuate slavery in factories. The Ten Hours Bill was intended to destroy that slavery. It was in evidence that the New Poor Law was intended to decrease the wages of the factory operatives. The Ten Hours Bill was, as I always believed and maintained, calculated to increase their wages. It was in evidence that the New Poor Law was, by the introduc-

tion of the families of agricultural labourers into the factory districts, intended to increase the competition of labour in factories. The Ten Hours Bill was intended and calculated to decrease that competition. For these and for other weighty reasons we resolved, as I think most wisely, and I am sure as Ten Hours Bill men most consistently, to resist the passing of the New Poor Law Bill.' In this view Mr. Oastler never wavered, and some twelve years afterwards he reiterated his conviction that the reasons above given were sound and right in all respects; and, though it is impossible to admit that the New Poor Law was 'intended' for this purpose, we may agree with him that many unscrupulous manufacturers contrived thus to work it for their own ends.

The condition of things above narrated existed at the beginning of her Majesty's reign, and for some years subsequently. In the session of 1836 Lord Ashley introduced a Bill into the House of Commons; the Government met it by a Bill to repeal the 'thirteen year old clause' in their own measure. This they carried by a majority of two; the nominal victory was a virtual defeat, and the Government abandoned their measure. But they promised to see that the Act of 1833 was enforced: the magistrates practically refused to enforce the penalties; the inspectors declared that it was more profitable to break than to keep the law. Popular discontent followed: a renewed attempt to pass the Ten Hours Bill in 1838 was defeated by a majority of eight. Other efforts also failed in the same and the following year, 1839. On March 3, 1840, Lord Ashley carried a motion for another Select Committee, and on August 4, of the same year, for the appointment of a Royal Commission 'to inquire into the employment of children in mines and collieries, and in mills and factories.' Both were agreed to. The Commission, to which reference is made previously, did its work well, as the reports abundantly show.

Increased agitation followed, and in 1843 a measure was introduced by Sir James Graham, but it satisfied no one except, perhaps, its authors. In 1844 an amended Bill was introduced, on the second reading of which Lord Macaulay supported Lord Ashley, whose motion was defeated. The Bill ultimately passed, 7 & 8 Vict. c. 15, 1844. This Act, though by no means sufficient, extended and systematised inspection; sub-inspectors were appointed, and a central office to which notices were to be given. Provision was made for the prevention of accidents, for inquiring into accidents should any occur, for compensation in case of injury; other branches of trade were brought under the Acts; and the employment of women was assimilated to that of young persons, and the cessation of labour in factories at 4.30 P.M. on Saturdays was made absolute for all those regulated by the Acts. By this statute no child was allowed to work in a factory under *eight years of age*, with provisions for meals and school attendance. Inadequate though this measure was, it laid the foundation for other and more sweeping reforms; but it was not accepted, even as a compromise, in lieu of the Ten Hours Bill by the advocates of the latter.

In the following year, 1845, 'An Act to Regulate the Labour of Children, Young Persons, and Women in Print Works' was passed, 8 & 9 Vict. c. 29, by which they were subjected to provisions analogous to those in the Act of 1844. In 1846 the agitation for the Ten Hours Bill was renewed. Lord Ashley brought in a Bill on January 29. On the second reading it was defeated by a majority of ten. Among those who supported Lord Ashley were Lord Morpeth, Lord John Russell, Lord Macaulay, Sir Robert Peel, Lord John Manners, and others; among the opponents were Mr. Hume, Mr. John Bright, Mr. Roebuck, and Mr. Cobden. The greatest speech delivered was that by the member for Leeds, Mr. T. B. Macaulay, afterwards Lord Macaulay.

A campaigning tour was subsequently arranged, when Lord Ashley visited Lancashire, and Mr. Oastler and Mr. Fielden, Scotland; and everywhere the people enthusiastically supported the Ten Hours Bill. On January 26, 1847, the Bill was again read a first time; on February 10 came the final struggle and the victory—the Bill was carried by a majority of 108, amid tremendous cheering. Efforts had been made to divide the supporters by offers of eleven hours, but the Ten Hours Bill men stood firm as a rock. In the House of Lords the principal opposition came from Lord Brougham; but the Bill passed, by a majority of forty-two, without material change in any of its main provisions. It passed its final stage on June 1, and received the royal assent on June 8; on July 23 the Speaker of the House of Commons, when addressing the Queen and the House of Lords with reference to this measure, said: 'We have found it necessary to place a further limitation on the hours of labour of young persons employed in factories; and by giving more time and opportunity for their religious and moral instruction, for healthful recreation, and the exercise of their domestic duties, we have elevated the character and conditions of a large and industrious class engaged in manufacturing operations.' This Act was 10 & 11 Vict. c. 29, now repealed.

'Ten Hours Bill' passed, 1847.

The general principles for regulating labour &c. in factories by means of legislation may be said to have been established by the Acts already referred to. The path of further legislation was rendered comparatively smooth, though obstacles were raised at every subsequent step in the same direction. Indeed, every inch of the ground may be said to have been contested. In 1850 an Act was passed 'to Amend the Acts relating to Labour in Factories' (13 & 14 Vict. c. 54). So stupid were the provisions of this Act, that children were placed in a worse position than women and

young persons, but this defect was remedied by the 16 & 17 Vict. c. 104; and in 1856 another Act was passed, 19 & 20 Vict. c. 38, the provisions of which need not detain us. In 1860 an important Act was passed, 23 & 24 Vict. c. 78, 'to place the Employment of Women, Young Persons, and Children in Bleaching and Dyeing Works, under the Regulations of the Factory Acts;' in the year following, 1861, the provisions of those Acts were extended to lace factories. In 1862 further provision was made as to bleaching and dyeing works, and in 1863, and again in 1864, the Acts were extended to other branches of textile industries. In the latter year, 'The Factory Acts Extension Act, 1864,' 27 & 28 Vict. c. 48, brought a whole group of fresh manufactures and industries within the pale of legislative regulation.

In 1867 another Factory Acts Extension Act was passed, 30 & 31 Vict. c. 103; and in the same year was passed 'The Workshops Regulation Act, 1867,' 30 & 31 Vict. c. 146. This statute marked a new era in protective law, and was the starting point for an entirely new series of Acts. The first-named Act extended the provisions of the Factory Acts to new industries, and made inspection much more efficient; the second Act embraced 'domestic manufactures,' as well as labour in workshops or factories, and really applied to parents as well as to employers. In 1870 commenced an entirely new series of Acts, being an incorporation of the hitherto separate Factory Acts and Workshops Act; its title was: 'An Act to Amend and Extend the Acts relating to Factories and Workshops, 33 & 34 Vict. c. 62.' Print works are by this Act regulated similarly to other branches of the textile trades.

In 1871 the work of consolidation was carried still further by the 34 & 35 Vict. c. 104, by which other branches of industry were brought under the Acts, and the work of inspection was rendered more complete and efficient. In

1874 a further important addition was made by the enactment of the 37 & 38 Vict. c. 44. After three years of agitation, Mr. Disraeli's Government found itself pledged at the elections of 1874 to adopt a measure introduced by Mr. Mundella in 1871, effecting most important changes in factory labour. The age for the employment of half-time children was raised from eight to ten years; all the exceptional advantages enjoyed by silk mills and other branches of industry were abolished; the minimum age for full-time employment was made uniform for all factories, and was raised to thirteen years; and in case of the child's failure to pass a standard of education, to be fixed from time to time by the Home Secretary, half-time labour was to continue until the fourteenth year. The hours of labour for women and children were reduced to fifty-seven and a half per week, and other valuable provisions for health and education were enacted. Few amongst us realise that, until this Act came into operation twelve years ago, thousands of tiny English children of eight years of age trudged through the darkness of the winter mornings in our factory towns in order to reach the mills before bell-ringing at six o'clock; and although Mrs. Browning's immortal 'Cry of the Children' has been responded to by this beneficent legislation, yet there still remains much for our country to do on their behalf.

The crowning piece of legislation, having reference to factories and workshops, was completed and passed in 1878, by the 41 Vict. c. 16, entitled 'An Act to Consolidate and Amend the Law relating to Factories and Workshops.' This important statute is divided into four parts, and contains six valuable schedules. It embodies the whole of the general law relating to factories and workshops in the United Kingdom, every section in which statute bears witness to the desire, now almost universal, that women, young persons, and children shall be shielded from the evils,

physical and moral, which fifty years ago were destroying the masses of our people in all the more important industries in the kingdom. Taking it altogether, it forms a code of legislation for the protection of the young and of the weaker sex unexampled in history, and not to be paralleled in any country in the world. We cannot conclude this branch of our subject better than in the eloquent words of the Duke of Argyll: 'When we think for a moment of the frightful nature of the evils which this legislation has checked, and which to a large extent it has remedied—when we recollect the inevitable connection between suffering and political disaffection—when we consider the great moral laws which were being trodden under foot from mere thoughtlessness and greed—we shall be convinced that if, during the last fifty years, it has been given to this country to make any progress in political science, that progress has been in nothing happier than in the factory legislation.'

(b) The Mines Regulation Acts.

The condition of the mining population was in many respects even worse than that of the factory workers, as disclosed by the Royal Commission before referred to. But the facts, until then, were not so widely known. The miner's wife and child worked underground; they were located in villages and hamlets away from the busy hum of life; newspapers had not penetrated into their dwellings, and no wealthy employers had taken up their cause, as in the case of the factory operatives. The disclosures of the Royal Commission of 1840 shocked those who, before that time, had never given a thought to the poor miner. Some of those disclosures seem now, by the light of present experiences, to be quite impossible of belief. Who can think without a shudder of little children being harnessed by ropes or chains, and, *on all fours*, like dogs chained to a sledge, drawing the corves or trucks of coal along the narrow

passages of the mine, to the pit-bottom, and back again for another load throughout the live-long day? It speaks well for the Legislature that no sooner were these facts brought to light than an Act was passed to remedy the evils complained of.

The first Act was passed in 1842—the 5 & 6 Vict. c. 99—'An Act to Prohibit the Employment of Women and Girls in Mines and Collieries after the first day of March, 1843; to Regulate the Employment of Boys, and to make other Provisions relating to Persons working therein.' This was followed in 1850 by the 13 & 14 Vict. c. 100, 'An Act for the Inspection of Coal Mines in Great Britain.' This was but a temporary Act, limited in its operation to five years, and was repealed in 1855 by the 18 & 19 Vict. c. 108, which Act was substituted for the one repealed, and became a permanent Act. The provisions of this statute went farther than the preceding one, and provided for extended powers of inspection, and for the removal of inspectors by a Secretary of State if neglect of duty warranted such removal. In this statute rules were laid down for insuring the safety of the mine and of those employed therein; and special rules were established for each colliery—these were to be printed for the information and guidance of owners, overlookers, and miners.

In 1860 an important measure for the regulation and inspection of mines was carried—23 & 24 Vict. c. 151. Some of its provisions applied to all mines, others to coal mines only. This was followed in 1862 by the 25 & 26 Vict. c. 79, which prohibited single shafts in coal and iron-stone mines, and was intended as a means for insuring greater safety. These Acts were wider in their scope and influence than appear from their titles and main provisions, for they extended directly or indirectly to health and morals, and to education.

In 1872 'An Act to Consolidate and Amend the Acts relating to the Regulation of Coal Mines and certain other Mines' was passed—the 35 & 36 Vict. c. 76—and also in the same year, 'The Metalliferous Mines Regulation Act,' 35 & 36 Vict. c. 77; the latter being amended by 'The Metalliferous Mines Act, 1875'—the 38 & 39 Vict. c. 39. The Explosives Act, 1875, also affects mines, by section 59; and the Nuisances Act, 1875, sections 313 and 343. The legislation enumerated has done much for the miner, but much remains to be done. The Reports of the Royal Commission, which sat and took evidence for seven years, and of which the final report has just been issued, tell how exposed the miners are to deadly gases, and accidents from various causes, for the most part preventible, but not yet under proper legislative control.

The beneficial effects of the enactments referred to are proved by the fact that the ratio of deaths per 10,000 employed has diminished with each fresh enactment touching the safety of mines. From 1851 to 1860 the ratio was 4·072; from 1861 to 1870 it was 3·328; from 1871 to 1880 it was 2·353; and from 1881 to 1885 it was 2·008. With further legislation this proportion can be reduced greatly. But the condition of the mining population has improved vastly since the first Act was passed for their benefit in 1842.

(c) Coal whippers and ballast heavers.

To a certain extent the men engaged in the arduous labour of 'coal whipping' and 'ballast heaving' were under protection from 1710 to 1828-9. In 1831, 1838, 1843, and 1845, Acts were passed for their especial benefit, a registry office being established under the more recent Acts in the earlier years of her Majesty's reign. In the years 1851 to 1856 new regulations were issued, and at the expiration of those Acts the management of the office was taken over by the Trinity House of the Port of London. The regulations

under the before-mentioned Acts had reference to modes of employment, payment of wages, truck, and other matters affecting their welfare.

(d) Chimney sweepers.

During the period under review four Acts were passed having reference to chimney sweepers and chimney sweeping —the first in 1834, the second in 1840, the third in 1864, and the fourth in 1875. The horrors of the 'climbing-boy' system were brought under the notice of Parliament by the late Lord Shaftesbury, and the popular feeling aroused was enough to carry its abolition. The legislation referred to had the effect of improving the construction of flues, and regulating the labour of those engaged in the occupation of chimney sweeping.

(e) Bakers and bake-houses.

Bakers were protected to a certain extent under the Sale of Bread Act, 39 & 40 Geo. III. c. 71, and 41 Geo. III. c. 16 and c. 17. In 1821 a more general Act was passed, 1 & 2 Geo. IV. c. 50; and in 1822 a local Act, 3 Geo. IV. c. 106; this metropolitan Act was extended to the country by 6 & 7 Wm. IV. c. 37 in 1835. The complaint as to the provisions of these Acts was and is that they were not enforced, especially as regards Sunday labour. In 1863 the Bakehouses Regulation Act was passed, limiting the hours of work and making regulations as to sanitary conditions, and in 1878 this trade was brought under the Factory and Workshops Act section 21 as to Sunday labour, and sections 34, 35, and 45 as to employment and health. Other Acts affect them, such as the Public Health Acts, the Smoke Nuisance Abatement Act, &c. It is obvious, however, that the bakers of London are not sufficiently protected under any or all of these Acts, which are not properly enforced.

(f) British merchant seamen.

Statutes for the protection of sailors were passed prior to the Queen's accession. In 1833 one was passed chiefly with the view of protecting their wages and savings; in

1835 another was passed enacting certain sanitary provisions, and establishing a registry office for seamen. But it was in 1844 that Sir James Graham's Act was passed, which for many years was designated the Magna Charta of British sailors. In 1854 the Merchant Shipping Act was carried, all previous enactments being repealed by a separate Act. This Act was an immense code of 548 sections, with schedules and forms. Amendments followed in 1855, and again in 1862, in which latter Act steamships were dealt with for the first time; in 1864, dealing with cables and anchors; in 1867, 1871, 1872, 1873, and again in 1875, all of which statutes seek to improve the condition and insure the safety of the British sailor.

(g) Women and children employed in agriculture.

Agricultural labourers were first dealt with in 1867, by the 30 & 31 Vict. c. 130, when the gang system was abolished. Further legislation followed in 1873 by the 36 & 37 Vict. c. 67, by 39 & 40 Vict. c. 79, the Elementary Education Act, 1876, and in other ways by Acts of a more general character. The repeal of the Master and Servants Acts was a great boon to agricultural labourers.

(h) Brick fields.

Women and children employed in brick fields were brought under the Factory Acts in 1871, and are now under the Codified Act of 1878. Previous to legislation affecting them their condition was little better than that of the factory children in 1840.

(i) Canal boats.

Women and children employed on canal boats were first brought under regulation in 1877, by 40 & 41 Vict. c. 60; this Act was amended and extended by the 47 & 48 Vict. c. 75, and an inspector was appointed to see that the provisions of the law are enforced.

(j) Places of amusement.

Children employed in places of amusement are protected under the 42 & 43 Vict. c. 34 (1879) as regards dangerous performances, rendering the employer liable in case of injury, &c.

(k) Apprentices and domestic servants.

Apprentices and hired servants are protected in various ways, and their position is much improved by the general effects of legislation since 1837. As regards legal protection they have now little to complain of.

Enabling Law:

This second group of Acts, though differing from the first in character, is not less important in results. These, like the preceding group, must be treated under separate heads.

(a) Friendly Societies Acts.

At the head of this series the Friendly Societies Acts stand first, both as regards chronological order, and their value and importance. This mode of associative effort was recognised as early as 1793; and in 1795 further encouragement was given to such societies. Those Acts were extended to Ireland in 1796. Further amendments were carried in 1803, 1809 (two Acts), and in 1811. In the year 1829, by 10 Geo. IV. c. 52, 'An Act to Consolidate and Amend the Laws relating to Friendly Societies,' those societies were placed upon a tolerably secure foundation, and in 1834, by 5 Wm. IV. c. 40, the power of nomination to benefits was conferred upon the members. The first named of these two Acts, that of 1829, contained the germs out of which grew other forms of associative effort, to be subsequently dealt with. Some further amendments of the law took place in 1831–2, 1833, and 1834, but these need not detain us.

The first Act in her Majesty's reign was passed in 1840, the 3 & 4 Vict. c. 73, 'An Act to Explain and Amend the Acts relating to Friendly Societies,' which was followed by a more important Act in 1846—the 9 & 10 Vict. c. 27. By this Act, friendly societies were for the first time exempted from the provisions of the corresponding Societies Acts, &c., thus enabling the Odd Fellows, Foresters, Druids, and other large associations to grow up under legal protection. The 'frugal investment' clause in this Act afforded also the first legal protection to co-operative societies. Two other Acts were passed in 1847–8 and 1849 affecting

friendly societies, and in 1850 the Acts were consolidated and amended by the 13 & 14 Vict. c. 115, but as this was a temporary Act only, it was continued in 1852, amended in 1853 as to investments, and made permanent in 1855 by the 18 & 19 Vict. c. 63. This Act was, in some particulars, a retrograde step, for the 'frugal investment' clause and other clauses dropped out; but this disadvantage was partially remedied by other Acts of an analogous nature.

Friendly Societies.

During the intervening years, between 1855 and 1875, several Acts were passed affecting friendly societies and their members, and extending the benefits conferred in one way and another—one in 1858, one in 1859, three in 1860, one in 1861, two in 1863, one in 1864, one in 1866, one in 1870, one in 1873, and one in 1874. In the year 1875 the whole of the statutory law was consolidated and amended, and Mr. J. M. Ludlow was appointed chief registrar. The principal Act, 38 & 39 Vict. c. 60, 'An Act to Consolidate and Amend the Law relating to Friendly and other Societies,' was amended in 1876, in 1877, in 1879, and in 1882. The value and importance of this legislation cannot be overrated. The growth of self-help has been fostered, encouraged, and protected.

Accurate and trustworthy statistics as to the number of societies, of members, amount of funds, &c., are not obtainable for the earlier years of the period under review, but it appears that in 1837 the number of societies returned as depositors in the savings banks was 5,791 in the United Kingdom, the total deposits amounting to 785,109*l.*; by 1840 the total number of societies returned as depositors had increased to 7,963, and the total deposits to 1,005,345*l.* In 1884 the total number of societies making returns to the Registry of Friendly Societies was 5,121, and of branches 9,713, total 14,834. The total number of members at the date of the latest returns was 4,943,039, total income 3,548,982*l.*

Some of the 'orders,' as the larger friendly societies having branches are called, such as the Odd Fellows, Foresters, Druids, &c., have an enormous number of members and vast accumulated funds.

(b) Building societies.

These were the first direct outgrowths of the Friendly Societies Acts; but like other friendly societies they were in existence before legislation was effected. The 10 Geo. IV. c. 56 (1829) directly recognised such societies, or rather their objects, and the 4 & 5 Wm. IV. c. 40 further recognised such objects. The specific Act under which, for a period of 38 years, building societies grew and prospered, was the 6 & 7 Wm. IV. c. 32, passed in 1836. Some fifteen other Acts affected them, directly or indirectly, passed previously to the Consolidation Act of 1874, the 37 & 38 Vict. c. 42. Three or four amending Acts have passed since that date, but none of them make any great alterations in the principal Act.

No returns exist as to building societies previously to the Act 1874 sufficient in any way to indicate their numerical strength, their income, their expenditure, or their liabilities and assets.

The following brief table shows the growth during a period of ten years:

Year	Societies making returns	Total number of members	Total receipts	Liabilities to		Assets by mortgage.
				Shareholders	Depositors	
			£	£	£	£
1876	272	Not stated	7,824,442	8,262,586	4,025,275	11,793,926
1885	2,150	567,594	20,800,154	33,479,246	15,385,503	46,955,176

The total funds in the building societies returned for England and Wales were stated to be 50,556,366*l.*, of which 49,277,972*l.* was in England alone. Some societies are very large and prosperous; others, on the contrary, are small and stagnant. It would be interesting to know how many

persons have purchased their houses through the agency of such societies.

(c) Co-operative societies.

Industrial and provident societies form the second group of Acts directly springing from the Friendly Societies Act of 1846. In this Act the law affords protection to associative effort in the shape of life assurance, endowment, and insurance of property; and directly sanctions co-operative trading and any general purpose certified to be legal. In the Act of 1850 the 'frugal investment' clause is re-enacted, and enacts that the maximum payment at death shall be 100*l.*, of annuities 30*l.*, and sick allowance 1*l.* per week. In the Act of 1852 those enactments were retained, and the purposes were slightly enlarged provided that the objects were stated in the rules of the societies as certified.

In 1852 was passed the first Act specifically favouring co-operation, the 15 & 16 Vict. c. 31, 'An Act to Legalise the Formation of Industrial and Provident Societies.' This Act was amended in 1854 by 17 & 18 Vict. c. 25; in 1856 by 19 & 20 Vict. c. 40; and in 1862 the Acts were consolidated and amended by 25 & 26 Vict. c. 87. In 1866 further facilities were given for insurance of cattle, by the 29 & 30 Vict. c. 34; in 1867 the Act of 1862 was amended and extended; and in 1871 an Act to explain and amend the law was passed. In 1876 the laws were consolidated and amended by the 39 & 40 Vict. c. 45.

In many respects this series of Acts have had a wider influence, and are destined to exercise a more powerful effect upon society than the two series above enumerated. The Friendly Societies Acts provided the means for alleviating present suffering and administering to present wants; building societies provided homes for the industrious and thrifty poor, and in many cases created a class of owners of small property, who became independent thereby. But

the industrial and provident societies have created vast business concerns, in which the holders of the capital are mostly working men; they have become their own employers and managers, and share the profits, and in numerous instances they employ others not shareholders in the concern.

The enormous growth of co-operative effort during the last twenty-three years will suffice to show what strides it is making, and it may indicate the strides it is likely to make in the future. The total sales effected in the co-operative societies of the United Kingdom in 1862 amounted to 2,333,523*l.* In 1884 the total sales amounted to 30,424,101*l.* The total sales for the twenty-three years amounted to nearly 336,000,000*l.* sterling; the nett profits on which amounted to nearly 27,000,000*l.* sterling. The total number of members at the close of 1884 was 897,950; the total share capital was 8,646,188*l.*; the loan capital 1,830,836*l.*; and the nett profits on this year's business was 2,723,794*l.*—out of which the members spent for educational purposes 19,154*l.* The trade of the Co-operative Wholesale Society, having its headquarters in Manchester, is enormous. The number of societies holding shares in this concern is 738, representing 507,772 members; the share capital is 284,112*l.*; the loan capital and deposits 524,781*l.*; it has a reserve fund of 31,094*l.*; insurance fund of 40,084*l.*; the sales in 1885 amounted to 4,793,151*l.*; and the nett profits to 77,630*l.* The Scottish Wholesale had a capital of 326,169*l.* in 1886; the sales amounted to 1,147,785*l.*; the profits to 29,304*l.*

Co-operative production has not kept pace with distribution, but the co-operators are fast becoming their own producers. They are largely interested in the cotton industries, in the manufacture of boots and shoes, in watchmaking, hardware goods, hosiery, cutlery, woollens,

silk twist, elastic web, &c., and the principle has been applied with advantage to agriculture. The land and building societies in connection with co-operation are numerous and prosperous, and they are likely to be formidable competitors with the building societies under other Acts.

(d) Loan societies.

These also were an outgrowth of friendly societies legislation, but of late years they have not stood their ground. The two Acts of 1829 and 1834 made their purposes legal, and in 1835 an Act was passed for the establishment of loan societies in England and Wales, 5 & 6 Wm. IV. c. 23. In the following year the provisions were amended as regards Ireland. In 1840 'An Act to Amend the Laws relating to Loan Societies' was passed, 3 & 4 Vict. c. 110; this Act was continued by various Acts, and is now the principal Act relating to such societies. The number of returns in 1885 was 408: total members 41,065; advances to members 108,537*l.*; sums due by borrowers 299,481*l.*; due to depositors and shareholders 321,157*l.*

(e) Working men's clubs.

A large number of working men's clubs are now registered under the Friendly Societies and Provident Societies Acts, but the returns relating to them are not very complete.

The foregoing societies are exercising a beneficial influence upon the working classes generally, and they contain the germs of still further development. They inculcate thrift, promote temperance, and train the members in habits of discipline, self-reliance, and mutual help.

Trade unions.

As already stated, the combination laws were repealed in 1825, but trade unions were not thereby made lawful societies. They had the right of existence, but no protection for their funds or property. In 1846, by the 9 & 10

Vict. c. 33, 'An Act to Amend the Laws relating to Corresponding Societies, and the Licensing of Lecture-rooms,' it was enacted that proceedings taken under the 39 & 40 Geo. III. c. 79 should only be commenced in the name of the law officer of the Crown. This Act, precarious as its provisions were, gave a certain amount of negative protection, for it restrained prosecutions on the part of employers in moments of irritation, and it permitted the development of such societies as the 'Amalgamated Unions,' having branches in various parts of the country. In the same year the Friendly Societies Act was thought to confer advantages on the unions by protecting the funds of those which deposited their rules with the registrar; but this was a fancied protection, as was discovered in 1866 and 1867, when the funds of two societies were embezzled. However, it helped to develop the unions, and led Mr. Gladstone in 1861 to admit them to the privileges of the post office savings banks as friendly societies.

The first Act which directly improved the position of trade unions was passed in 1859, the 22 Vict. c. 34. This amended the provisions of 6 Geo. IV. c. 129. In 1865-66 rumours of gross outrages at Sheffield, Manchester, and Nottingham recalled attention to the unions, and led to a Royal Commission. The object of the inquiry was doubtless to stamp out the unions, but it led to a contrary result. A searching inquiry unmasked the perpetrators of the outrages, but exonerated generally the unions from all participation therein. The first result of the inquiry in the shape of legislation was a temporary Act in 1859 giving legal protection to the funds of the unions, and thus bringing them for the first time within the pale of the law.

In 1871 the Trade Union Act was passed; this was amended in 1876, and Acts were passed in 1875 which removed the last vestige of illegality from the trade unions

of the country. It is strange, but true, that these associations of working men, which helped so much to improve the law relating to all other societies, should be the last to reap any real advantages. But so it was. They bore the burden and heat of the battle: others reaped the spoils. But their turn came: their action was justified by the legislation of 1871 and 1876, and by the Acts of another kind in 1875.

Though struggling under adverse circumstances and under the ban of the law, they made immense strides from 1834 to 1849 and 1850. At this period a new departure was inaugurated by the engineers, by the amalgamation of the various branches of their trade into one consolidated Union. This is now the largest and wealthiest Union in the world. Other unions followed the example—the carpenters and joiners, the boiler makers and iron-shipbuilders, the iron moulders, the tailors, shoemakers, the cotton spinners, masons, bricklayers, and many more. Some of these have branches in all the more important towns in the United Kingdom; and some in America and on the continent of Europe.

The leading trade unions are benefit societies as well as trade protection societies. Their scale of benefits is more liberal than that of the friendly societies, for not only do they pay a weekly sum in sickness, a fixed amount at death, superannuation in old age, and compensation in case of accidents, but they also pay a fixed amount weekly to their out-of-work members. In this particular they are unique. They maintain their own poor; succour and sustain their sick, bury their dead, keep the aged and infirm members, and give a lump sum of, in most cases, 100*l.* in cases of total disablement.

Under the reign of law they have increased and are increasing in numbers, wealth, political power, and social

influence. The engineers with 50,000 members paid for 'out of work' in 1886 79,160*l.*; sick 29,457*l.*; superannuation 33,914*l.*; funerals 8,612*l.*; accidents 1,350*l.*; and in benevolent grants to poor members 3,151*l.*; total 155,644*l.* The reserve balance is still 112,487*l.* The unions have lived down prejudice and mistrust; they have triumphed over legal obstruction and popular antagonism; and now they are quietly and diligently improving the status of their members, and of the trades to which they belong. Through long suffering and persecution they have won their way to a foremost position as associations for mutual help and sustenance.

The Truck Acts.

The statute for the prevention of truck, and for payment of wages in the current coin of the realm, was passed in 1831, the 1 & 2 Wm. IV. c. 37, but it became generally disregarded because not rigorously enforced. The development of the railway system led to great abuses as regards truck; and in the mining districts and some of the manufacturing districts the system of truck was carried on unblushingly. No general Act has been passed to amend the law, but in 1872 a Commission so completely unmasked the entire system that it almost ceased of itself for fear of the consequences. In 1874 the Hosiery Manufacture (Wages) Act was passed, which put an end to the stoppages in wages in the hosiery trade. A further Act in 1883, the 46 & 47 Vict. c. 31, prohibited the payment of wages to workmen in public-houses and certain other places. No doubt the Truck Acts are now sometimes violated, but the systematic disregard of their provisions has ceased.

Employer's liability in cases of accidents.

In the year 1837 a case of considerable importance came before the courts, the question being whether an employer was or was not liable for the acts of his servants in the event of any injury happening to any of them through negligence or default on the part of others in the same

employment. Lord Abinger decided that the master was not liable unless he was himself in fault. In another case, from the Scotch Courts, Lord Cairns, in 1867, decided similarly. Between those two decisions two Acts were passed, one in 1846, the 9 & 10 Vict. c. 93, the other in 1864, the 27 & 28 Vict. c. 95, but neither of those statutes touched the principle upon which the adverse decisions were given, namely, 'common employment.' It is singular that the latter Act did not deal with the matter, seeing that a case had been before the Courts from 1855 to 1858 in which the issue had been directly raised. The decision in the latter case led the miners to agitate for a 'Compensation for Injuries Bill,' and an Act was promised in 1873, but it never saw the light.

The uncertainty of the law, and, indeed, its injustice, was set at rest in 1880 by the passing of the 43 & 44 Vict. c. 42, 'An Act to Extend and Regulate the Liability of Employers to make Compensation for Personal Injuries suffered by Workmen in their Service.' This statute partakes of the dual nature of being at once a protective and an enabling Act. It protects by the enforcement of liability, and it enables by the compensation afforded in case of injury. The measure is not perfect by any means, but it has had a most beneficial effect already by causing increased precaution against accidents, and by awarding damages where neglect or default has been proven.

Arbitration and conciliation.

In reviewing the history of Association, it has been shown how trade unions have grown in power and influence; it is gratifying to know that one of the results of their growth has been the introduction of successful efforts for settling trade disputes by means of arbitration and conciliation. So long as workmen were isolated in their action, no system of arbitration could avail; when, however, they became associated, it was found possible for employers

to deal with bodies of men, through the officials of the union. Both parties were thus placed on a footing of sufficient equality to be able to discuss alleged grievances, and demands as to wages, with freedom and mutual forbearance. Employers were brought face to face with the men, through their chosen representatives; and the latter were compelled to examine the demands of their constituents in all their bearings, both with regard to the general condition of trade, and the prices ruling in the district where the dispute arose.

Legislation for the settlement of disputes by arbitration existed before the commencement of this century; it commenced by what are known as the Spitalfields Acts. Those Acts were, however, local in their application and effect, and in reality did little more than provide summary methods by which to adjudicate upon wages in magisterial courts. An effort was made to extend the system in 1798–9 to cotton manufactures, singularly enough under the title of 'Import,' in the Stamp Act of that date. A more serious effort was made in 1824, by 5 Geo. IV. c. 96, when all existing provisions were brought into one statute by 'An Act to Consolidate and Amend the Laws relative to the Arbitration of Disputes between Masters and Workmen.' In the first year of her Majesty's reign this statute was amended and its provisions extended, by 1 Vict. c. 67; but the method provided in both was the same—namely, a kind of civil process in a magisterial court for the adjudication of disputes between masters and workpeople. In the year 1845 two Acts were passed, one having reference to the hosiery trade, the other to silkweavers. In consequence of a desire to effect the same object otherwise than by quasi-legal process, Lord St. Leonards introduced a measure, providing for the establishment of Courts of Conciliation; this was carried in 1867. In the year 1872 an 'Arbitration Act' was passed,

having a much wider scope, but for some reason or other it has been inoperative.

If, however, legislative enactments have done but little towards the settlement of disputes by arbitration, or in preventing them, by means of conciliation, very important results have accrued by the institution of Boards of Conciliation and Arbitration in various localities, and in several large industries. And here, perhaps, it will be excusable if the words of an independent authority are quoted as to the introduction of the system and its working, in preference to any remarks by the present writer. Mr. Henry Crompton says:[1] 'About the year 1830 the principle of arbitration was advocated as the best means of insuring peace between labour and capital. But it was not until 1860 that any permanent system or board of arbitration came into actual operation. The two men who have been most instrumental in this work, and whose names will be long remembered in connection with this movement, are Mr. Mundella and Mr. Rupert Kettle.' 'Both Mr. Mundella and Mr. Kettle agree that these boards ought to be voluntary, and not compulsory. They believe that compulsion is fatal to conciliation. Some of the trades unionists have certainly been in favour of compulsory arbitration. But I believe that the present compulsory legal powers have never been used by either side to compel the other to arbitrate on any dispute. Mr. Mundella and Mr. Kettle rely on the moral coercion which the employers and the men can exercise over the individual members of their respective bodies. The influence of the employers and fair reasoning are sufficient to make any employer, who might be disposed to disregard the decision of the Board, see the advantage in the long run of loyally accepting an unfavourable decision of the Board. With the workmen there would be great difficulty if there were

[1] *Industrial Conciliation*, by Henry Crompton, 1876, p. 19.

no trades unions. There is no way of binding men to accept the decision of the Board, unless there are unions or some other organisation among them that would have the same power over them. Happily, the trades unions have been able to discharge this function, and not for the unionists only, but for the non-unionists as well. The latter are very glad to avail themselves of the advantages accruing from the established organisation of the unions; and the Board is, in fact, a bond of union and peace between unionists and non-unionists.' [1]

The institution of such Boards began with the hosiery trades in Nottingham, in 1860; then followed similar Boards in connection with the building trades, in Wolverhampton; in the whole of the pottery trades of Staffordshire; in the whole of the manufacturing iron trades in the North of England, the head-quarters of the Board being at Darlington; in many of the coal-mining districts of England, and in several other industries in various localities. An investigation into the working of the system by an American led to its introduction into the mining and iron districts at Pittsburgh, in the United States, with most beneficial results. In France steps are being taken at the present time to legalise the application of arbitration and conciliation to all the industries of France. Although no legalised system is in force in this country, the sentiment in favour of some general mode of dealing with trade disputes in this way is growing. If awards are not enforced, nor enforceable by law, there is usually a laudable loyalty in accepting the awards, on both sides. In a few instances they have been resisted, but always with most disastrous consequences, the lessons of which are seldom forgotten. The entire system of arbitration and conciliation may be summed up in the words, 'Come, let us reason together,' and the prin-

[1] *Industrial Conciliation*, pp. 40, 41.

ciple, when cordially accepted, cannot fail. Employers and workmen meeting at the same Board, to discuss dispassionately the differences that exist, have prevented numerous strikes and lock-outs, and the distress and suffering which these always entail. The success of the past is an augury of the future, and this one outcome of associative effort is fruitful of peace in industrial pursuits.

General results.

This brief survey of the legislative measures for the protection of working people, and for encouraging thrift and self-help, shows that during the last fifty years the Legislature has not been unmindful of its duties. The legislation has been slow, cautious—we may say, in many instances, timid; but each successive step has been an advance in the right direction. No branch of industry has been neglected; no method of mutual help has been altogether left out in the cold. The effects of these legislative measures are scarcely realised by the present generation. Only those who can remember the condition of the people some forty or fifty years ago can realise the immense changes which have taken place.

And much is due to that very protective and enabling legislation, which is regarded by many as paternal in its character, and tending to enfeeble self-reliance, and to discourage self-help. On the contrary, the self-reliance and the self-help of the people have developed in the same ratio that the State has interfered to benefit them. As the direct outcome of industrial association, springing from the people, we have seen co-operation, both productive and distributive, developed to an extent and managed with an ability truly marvellous on the part of the working classes themselves—we have seen the establishment of friendly societies on a scale unknown to any other country —we have seen trades unions influencing every branch of

our national industry—we have seen the successes of arbitration and conciliation—and nowhere has the associative effort been so effectual, and its growth so astonishing, as in those very factory districts which have been the subjects of periodic legislation.

The people are better paid; they work fewer hours; they are better fed, clothed, and housed; they are better educated; their habits and customs are improved; their sports and pastimes are no longer brutal and demoralising. The children and women are better cared for and better treated. The wheels of progress have gone on and on with accelerated speed. This is a matter of encouragement, as well as for thankfulness. The masses of the people having now been admitted within the pale of citizenship, can if they please still further improve their condition by means of legislation. The future is in their own hands. They are masters at the polling-booths—they can decide at the ballot-box as to the measures to be passed, and the time for their enactment. The platform, the press, and the Legislature are open to them—if they wisely use the means at their command, their progress in the future will be even more rapid than in the past.

A. J. MUNDELLA.
G. HOWELL.

LOCOMOTION AND TRANSPORT.

RAILWAYS, SHIPPING, POSTS, AND TELEGRAPHS.

The nature of the change.

Among the many alterations which mark the record of the past fifty years there has been none more noticeable than that which has taken place in the means of communication. Many different agents have combined to effect the improvement. Steam and electricity have been introduced as new motor powers, while careful organisation has enabled these forces to produce results which had otherwise been impossible. Not only in one but in every department of life has the change left its subtle mark, for by it distance, once the sentence of isolation, has been bridged over. Personal intercourse has been promoted, fresh means of transport provided, and facilities afforded for the quick communication of news. In order to review the progress achieved in these various directions, it will be well to begin with the introduction and extension of the railway system, then to consider the advantages with which goods may now be transported both by land and by sea, and in the last place to recapitulate the changes which have been made in the postal department, including under the last head the telegraph and the telephone.

(1) Railways.

Railways before the reign.

The growth and extension of railways began but a very few years before the present reign. Before the opening of the Liverpool and Manchester line in 1830 there had been

little practical proof of their value, and, indeed, until 1836 they had not been of sufficient importance to become the subject of commercial speculation. But about that time the country awoke to the importance of the new means of communication, and the idea that both industrial progress and social development would be furthered by it took sudden possession of the public mind. It is, then, from this year, 1836, that we may date the rapid and continuous extension of the railway system in this country.

The difficulties of travelling,

Since the close of the Middle Ages inconvenience and expense had made travelling the privilege of a class, whose monopoly was but little interfered with. Though the roads had been greatly improved, and personal security assured, little else had been done to facilitate communication. In the January of 1837 the mails had to be conveyed from Canterbury to Dover in sleighs, while on other occasions they had been sent round the coast by steamer. In the November of the same year the whole traffic of the north-west was interrupted by terrible floods.[1] It is true that, as far as concerns the carriage of goods, the present century showed one considerable advance, inasmuch as canals, by supplementing the river system of the country, offered a new means of transport. But there were grave complaints as to their management and efficiency. The canal-owners were despotic, and 'established a rotation by which they sent as much or as little as suited them.' The effects were disastrous. Merchants could get but a small portion of their goods forwarded, and so many a mill stood idle while the raw material required for manufacture remained in the warehouses. Goods, for instance, conveyed across the Atlantic in twenty-one days were often delayed for six weeks in Liverpool before they were sent on to Manchester.[2]

and transport.

[1] *Annual Register*, at dates.

[2] Francis, *History of Railways*, i. 78.

Canals, too, were of no use to passengers, who, it may be said, could travel with little greater rapidity in the time of George IV. than in the time of the last Stuarts. The position may be emphasised in another way. In the event of invasion, the military forces could not have been mobilised with more convenience or in much less time than during the disastrous rebellion of 1745.

First period—that of experiment, 1830-37.

The events of the years from 1830 to 1837 were decisive with regard to the future of railways. It was the period of experiment. The opinion of the country was unfavourable. Sir Henry Parnell, so late as 1833, gave the somewhat tentative opinion that, when the trade was altogether a descending one and water scarce, railways were preferable to canals and might be constructed cheaper,[1] while in 1830, Lord Brougham wrote with indignation 'of the folly of seven hundred people going fifteen miles an hour in seven carriages.' More characteristic still had been the expressive vehemence of the *Quarterly Review* of 1825, which anticipated that people would as soon suffer themselves to be fired off upon Congreve's ricochet rockets as trust themselves to a machine going at the rate of twenty miles an hour. Abroad opinion was even more discouraging. Thiers considered steam locomotion of comparatively little importance, as its use would necessarily be confined to short lines in the neighbourhood of large towns. But these forecasts were discredited by successful experiments, and in 1836 a sudden improvement in the commercial prosperity of the country led to a readiness to invest in the new undertakings. There was something approaching to a railway mania. Thirty-five Acts were obtained for the construction of 994 miles of railroad,[2] and so wild were the projects afloat, that while one projector persuaded a company to try

The opinion of the country.

[1] Parnell, *On Roads*, p. 107.

[2] Francis, *History of Railways*, i. 283.

sails as a means of propulsion, another seriously advocated the employment of rockets.[1] But, despite these extravagancies, much solid progress was made, and the new year of 1837 opened with favourable prospects. Acute observers realised the change. The language of the country had begun to be infected—men talked of 'getting up the steam,' of 'railway speed,' and reckoned distances by hours and minutes.[2] 'Were they delayed an hour or two beyond the accustomed time, they felt themselves justified in expressing impatience and dissatisfaction.' As yet, however, there were not two hundred miles of railroad opened,[3] and elsewhere the inconvenience of travelling was just as great as before. But the work of extension was busily proceeding, and, despite the stolid opposition of the landed proprietors, the main arterial system of the country was laid down in project if not already in process of construction. The Manchester and Liverpool line was in active use, and the Grand Junction, which would connect that line with Birmingham, was to be opened that very year. In the next year the London and Birmingham was completed. During the Parliamentary session of 1836 Acts had been obtained for the Great Western and the Midland Counties. South of London railways had been sanctioned to Southampton and Brighton; while in the east might be seen the beginnings of the Eastern Counties line. Most of those men whose names were afterwards to be inseparably connected with the history of railway enterprise were engaged on some of these projects. Robert Stephenson was winning a second reputation for his family. On the track of the Great Western, Brunel was seeking to justify his theoretic preference for the broad gauge. Brassey was part contractor for the Grand Junction. In 1837 George Glyn became

Change about 1837.

Construction proceeds busily.

[1] Francis, *History of Railways*, p. 293. [2] Quoted Francis, i. 283.
[3] Hunt, xvi.

chairman of the London and Birmingham Railway, while within a few years Morton Peto was to undertake the line through the Eastern Counties. The citizens of York were busied with the project of the York and North Midland, for which an Act was passed that same year, and prominent among the promoters of which was George Hudson.

Second period—that of extension.

Thus the commencement of the present reign marks an epoch in the history of railways. The period of experiment gave place to the period of growth and extension.

The most ample recognition of the practical utility of the railroad, and thus of this important change, was afforded by the Act[1] for the transmission of the mails in the following year (1838). But, though public opinion was on the whole favourable, there was considerable incredulity as to the actual results which might be achieved in the future. It was still thought that steam power could be employed to greater advantage on the water than on land. 'The prospect of travelling from the metropolis to Liverpool, a distance of 210 miles, in ten hours,' was regarded with astonishment, but it was not generally anticipated that less than half that time would be found sufficient by the next generation. The people of Edinburgh were surprised at receiving their letters in thirty-one instead of fifty-five hours: Surprise had yielded to scepticism had they been told that before long the journey might be made in nine. There were some, however, who do not seem to have shared in such incredulity. 'Twenty-five miles an hour,' says one,[2] 'is not so very rapid.' If there were no stoppages, he considered that the journey speed between two distant towns might reach one hundred with perfect safety. Even among those who were most sanguine, there were very different notions as to the mode in which steam might be applied to con-

Forecasts as to the future.

Different ways of employing steam power.

[1] 1 & 2 Vict., c. 98.

[2] *Edin. New Phil. Journal*, vol. xxiv. Edward Sang, F.R.S.E.

duct the traffic of the country.[1] For a long time it was thought that the railroads might be worked to the greatest advantage with horses, while on the other hand, when the utility of steam was seen, the attempt was made to introduce locomotives with carriages upon the ordinary roads and amidst the general traffic.[2] Within a few years several expedients were tested and abandoned. Trains leaving Liverpool and Euston were drawn up the steep gradients by stationary engines placed respectively at Edge Hill and Camden Town—a system more thoroughly adopted on the London and Blackwall Railway, where the trains were worked by means of a cable.[3] The dangers and disadvantages of this system were very apparent, but there was another which obtained considerable notoriety, and which under certain circumstances might be successfully employed. The railway papers of the day teemed with accounts of what is now known as the atmospheric system. The more elementary plans, which proceeded on the principle of the common popgun, were soon laid aside, but at length a scheme was elaborated which had the appearance of practicability. It was proposed that the 'atmospheric power should be created in a pipe, laid between the lines, and of such a nature as to permit of the pressure being communicated to a carriage attached to it on the outside and yet travelling upon the proper roadway.'[4] The power was created by suction, and made to affect one carriage, which supplied the place of an engine. This mode was adopted between Kingstown and Dalkey, and between New Cross and Croydon, and it was further intended to apply it to the line between Exeter and Plymouth. In 1845, indeed, it was advocated before a

The cable railway.

The atmospheric system.

[1] 'Feasibility of the Employment of Hydraulic,' discussed in *Railway Register*, vol. i.

[2] For a description see Freyberg, p. 37.

[3] Clifford, *History of Private Bill Legislation*, i. 51.

[4] *Railway Register*, i. 23.

Parliamentary Committee,[1] when, with the exception of Stephenson and a few others, the engineers of the day, including Brunel, were found to be favourable rather than adverse to the proposal. The real objection is now clear enough. It deprived the train of its flexibility, and made it rather an automaton, under the control of a distant power, than a creature almost living and animated by immediate human intelligence.[2]

There were two features overlooked.

The public, although their attention was thus closely directed to the subject of railways, failed to appreciate the two features, now the most prominent features of their development. The intricacy of the problem introduced by their anomalous relationship to the State was not even foreshadowed. Nor was there any adequate conception of the magnitude of their effect on the conditions of life, either in the total results or in the more picturesque details.

The legal position of the railway.

It is scarcely a matter for surprise that the former of these two points should have escaped notice, for the early conditions of the railway question were not such as to suggest it. Railways were far from being regarded as a monopoly. They were rather a protest against the monopoly of the canal companies. It was never intended that the various companies should set up an exclusive claim to the traffic over their own lines, for just as a canal was a water high-road, so a railway was regarded as a high road *under particular conditions*. The company owning it had no further right than that of exacting tolls from all who might choose to avail themselves of the conveniences which they provided. Unfortunately, these particular conditions went far to abrogate all the common rights which form

[1] *Parliamentary Papers*, 1845, vol. x.

[2] Horses were used to draw carriages on the railroad for some time. *Parl. Papers*, 1839, vol. x. Questions 4,398, 4,638.

part of the definition of a high road. But even the ingenuous *naïveté* of that age could not tolerate for long a scheme which would allow any one to use their own carriage and engine, provided that they paid toll and observed the 'rule of the road.' The dim suspicion that there was some difference in kind between a railway and a canal or highway soon took a more definite form, and the Select Committee which sat in 1839–40 pointed out that monopoly was inevitable. It was quite clear that private owners could be barred from access to the stations of the company, and would be provided with scant facilities for their traffic. It was equally clear that the safety of the public demanded that there should be only one authority on each line. A private coachman may know very little about horses; but a private engine-driver would know nothing at all about machinery.

Committee of 1839-40:

But if a power of monopoly was thus granted, it was necessary to see that some means were provided to secure proper regard for the interests of the public, since these might, and often would, differ from the interests of the companies. Some thought that the competition between canals and railways would secure the necessary attention; and such seems to have been the opinion of the Committee, which advised that the power of monopoly should be granted to the respective companies and that a careful supervision should be exercised over the management of the various lines.[1] This latter clause was of course inconsistent with the former, and represents a lingering suspicion as to the effects of competition, which led them to interfere with its action despite the reliance they professed. The legislation passed in consequence of these recommendations did not meet the needs of the time, and in 1844 a new Committee was appointed. The railway interest had then increased enormously. Already some 2,000 miles of line were open, and the period

advises grant of monopoly over their respective lines to the companies.

Committee of 1844:

[1] *Parl. Papers*, 1839, vol. x.

of the great mania was at hand. Besides, another feature of the difficulty had presented itself. Competition was not now limited to the railway and the canal, but it was active between the various lines. The Committee then met with the knowledge that whatever monopoly there might be, must be a great one, that the importance of the railway system was beyond doubt, and that rival interests were at work. In its report it showed the fullest recognition of these facts. It set forth the reasons which led to the conviction, not only that interference with the management of the railways was most undesirable, but that this internal competition was both costly and prejudicial to the public interest. The function of the State was to be confined to careful examination of all proposed legislation; and that due provision might be made for the intelligent exercise of this power, it advised the formation of a Railway Department, which might maintain such supervision as was needed, conduct inquiries, and formulate statistics. The essence of the report lay in a further recommendation. It raised the question of State purchase. Just in proportion as monopoly was inevitable and the national importance of railways undoubted, it was unwise to allow the creation of further vested interests. In consequence of this advice, a clause was provided for insertion in all railway Bills which allowed the right of purchase to the State within twenty-one years.[1]

suggests State purchase.

Then came the railway mania. In the year 1844 fifty-seven Acts were passed for 805 miles, in 1845 one hundred and twenty for 2,700 miles, in 1846—the year of climax—two hundred and seventy Acts for 4,538 miles, and in 1847 one hundred and ninety Acts were passed for 1,354 miles. But there had been over-speculation. Of the 8,592 miles sanctioned during these three latter years, 1,560 were abandoned with, and some 2,000 more without, Parliamentary sanction.

The railway mania.

[1] *Parl. Papers*, 1844, vol. xi.

The extravagance of the time was shown by the calculation that from March to September 1845 over 6,000,000*l.* were expended in bringing the shares of the schemes in the market to par.[1] In the money market and throughout the country excitement was extreme, and speculation reckless. One man was director in twenty-two companies. Three held the same position on the boards of nineteen lines. In two days George Hudson obtained, from various bodies of shareholders, the approval of forty Bills, which involved the expenditure of 10,000,000*l.* As November 30 drew on, by which day all schemes had to be deposited, the excitement rose to an extraordinary pitch. The engineers could scarcely allow themselves rest. They began their work of survey as soon as daybreak permitted, continued it by torchlight, and spent the night in drawing their plans. Still their numbers were insufficient. The most incompetent people were pressed into the service. 'Schoolmasters who could not make a living, clerks who knew a book of Euclid, became heaven-born engineers.'[2] One of them could not set his level. Another, sent down from the Government offices, did not know what a gradient was. The natural result of the mania was a period of reaction and suffering; but yet the length of railroad open in 1850 was treble what it had been in 1844. Moreover—and this was the most important result—the mode of locomotion was determined, for from amongst the different theories which had been formulated, the test of practice had singled out one. Meantime legislation had been busily carried on. In 1845 the sale or transfer of railways was prohibited except under sanction of Act of Parliament. In 1846 the Gauge Act was passed, while in the same year the Board

and consequent legislation.

[1] *Railway Register*, vol. iii.

[2] Grundy, *Pictures of Past Years*, pp. 150, &c. Cf. *Personal Recollections of English Engineers*, pp. 48–50.

of Railway Commissioners was constituted.[1] There was other legislation during the earlier years of even greater importance, such as the series of general enactments about the position and right of railways, contained in the Railway Clauses Consolidation Act and the Canal and Railway Carriers Act.

Amalgamation and a new Committee, 1853.

But the growth of a new and monopolised interest, which had been the subject of previous warning, forced itself into public notice, and became a real and pressing danger with the spread of the system of amalgamation. In 1846 the London and Birmingham, the Liverpool and Manchester, and the Grand Junction were combined into one company. By the end of the same year the Great Western had absorbed six smaller lines, and through succeeding years this work of amalgamation proceeded with equal rapidity. The Railway Board pointed out the effect it would have in modifying competition. A Select Committee in 1853 tried to find some effectual means of prevention or remedy, but all their efforts were in vain. The results expected from competition were further impaired by the voluntary agreements or combinations entered upon by the various companies with regard to rates and fares.

The Committee of 1865.

Meantime, the period of twenty-one years allowed by the Act of 1846 was running out, and in 1865 a new Committee was appointed to consider the whole question. The facts could not be blinked: the enormous influence of the new monopoly was undoubted. Even in 1850 the capital, paid up, amounted to 240,000,000*l.*; in 1865 it had reached 455,000,000*l.* It would have been a very bold scheme that proposed to add that amount to the National Debt. But though the magnitude of the sum may reasonably explain any unwillingness to venture on a measure of State purchase, it can hardly justify an indifference which allowed

[1] These powers were transferred in 1851 to the Board of Trade.

the period, during which such an act was possible, to elapse without fixing upon any alternative policy. This, however, is what occurred, and the Government of the day rested content with having made up its mind in the negative.

Joint Committee of 1872, which criticises.

The most complete criticism of past railway legislation, and the fullest exposition of the working of the present system, was furnished by the Joint Committee which sat in 1872. It showed clearly that competition did not achieve the results which had been anticipated. Where there were alternative sea routes, the rates were, it is true, considerably reduced, and to a limited extent a like conclusion held good when canals afforded the necessary rivalry. But between the various railways competition had given way either to combination or, still more, to amalgamation. The main system of the country lay in the hands of some few great companies, while certain districts experienced a more complete monopoly. On the east the Great Eastern had no rivals. The Great Western occupied a like position with regard to part of the west. The London and North-Western sought to make Lancashire its own district, and the Midland throughout part of its course had no competition to fear. Thence it comes that the report, while beginning with the admission that the evil predictions about the result of amalgamation had not been fully realised, points out in conclusion that although the *permanent* interests of the railway companies might coincide with those of the public, yet it was by no means certain that both these would not be sacrificed for an increased dividend.[1] A large bonus does not imply a reduction in fares.

Recent tendencies.

The experience of the last fifteen years has, in some respects, illustrated, in others modified, these conclusions. As formerly the construction of the railroad between Liverpool and Manchester infringed the domain of the canal

[1] *Parl. Papers*, 1872, vol. xiii.

companies, so in recent years the Ship Canal has been regarded as a protest against the monopoly by railways. There has been a growing demand for the revision of rates. In 1881 and 1882 Committees were appointed to consider the subject, but they did little else than hear multifarious evidence and recommend that additional power should be given the Railway Commissioners for dealing with grievances and additional opportunity afforded to the public for making complaints. Yet in one direction the lessons of recent experience have been sufficiently definite, for, in defiance of the alleged unity of interest between the companies and the public, the course of the agitation consequent on the introduction of Mr. Mundella's Bill in 1886 showed that there was, at any rate, little recognition of such identity. Owing to political occurrences this Bill did not come practically before Parliament, but the feelings which instigated and approved it continued in force; a Royal Commission was appointed, and in the present year (1887) a new Bill has been brought forward with much the same end in view.

The Railway Bill.

With the great mania began a new development in railway enterprise. The first period, ending about 1836, had been the period of experiment. Then had come the second period, in which energy and skill had been chiefly spent in extending railroads throughout the country; while during succeeding years the question of their management was rendered important by the very intricacy of the interests thus created. It is impossible to confine these different movements within precise limits of time, but it may be said that the third period in the history of the railway, that which may be pre-eminently called the period of management, begins at this date, although the period of extension continues and overlaps. The following table shows that, though the work of construction proceeded

Third period—that of management.

more rapidly during the earlier quinquennial periods, the efficiency of each mile of line was small in comparison with what it afterwards became. To achieve such a change demanded very careful organisation.

	Length of line at end of each year in miles	Increase per cent. of miles open	Number of passengers conveyed per mile open
1837	200	—	—
1842	1,857	—	9,937
1847	3,945	58	13,017
1852	7,336	86	12,150
1857	9,094	24	15,395
1862	11,551	27	15,625
1867	14,247	23	20,201
1872	15,814	11	26,803 [1]
1877	17,077	8	32,180
1882	18,457	8	35,479

Its chief features.

The alterations made during the third period display themselves, however, most prominently in the increased convenience and safety of travelling. At the beginning of this reign a journey was a matter of considerable forethought and material discomfort.

The inconvenience of a journey at the beginning of the reign.

Information as to the departure of the train had to be sought from the fly-leaves issued by the companies or the notices contained in the advertisement sheets of the papers. In 1839 the first 'Bradshaw Railway Guide' was issued, a double page of which we reproduce in facsimile from the copy preserved in the Bodleian Library. It was a very small volume, some four inches by three in size, and was sold at the price of sixpence. It only contains twenty-four pages, most of which are taken up with maps, plans of towns, and details as to cab fares, while the railway information occupies some half-dozen pages. Three years later the monthly guide first began to appear.

The intending passenger had to make his way to the station in good time, so that he might secure his seat and

[1] This year and after exclusive of season-ticket holders.

LONDON TO BIRMINGHAM.

Distance from London.	STATIONS.	Mixed. 6 a.m.	Mixed. 8 a.m.	First calling at M. Sta. 8¼ a.m.	Mail. 9¼ a.m.	Mixed. 11 a.m.	Mixed calling at Int. St. Sta. 1 p.m.	Mixed. 2 p.m.	Mixed Short. 6 p.m.	First Class. 6 p.m.	Mail, Mixed. 8¼ p.m.	FARES. 1st cl. car. by day, or 1 class 6 in. by night	1st class car. Wage, 6 in. ride, by day	2nd class car. Wage., closed, by night	2nd class car. Wage, open, by day
Miles		H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H.M.	H. M.	H. M.	H. M.	s. D.	s. D.	s. D.	s. D.
	LONDON	6 0	8 0	11 0	9 30	11 0	1 0	2 0	6 0	6 0	8 30	3 6	3 0	2 6	2 0
11¾	HARROW	..	8 30	..	..	..	..	2 30	..	6 30	..	5 0	4 0	4 0	3 0
17¼	WATFORD	6 46	8 60	..	..	11 46	1 46	2 60	5 45	6 50	..	7 0	5 6	4 6	4 6
24¼	BOXMOOR	..	9 10	..	..	..	..	3 10	..	7 10	..	8 0	6 6	5 6	5 0
28	B. HAMPSTEAD	..	9 20	10 6	..	..	..	3 20	..	7 20	..	8 0	7 6	6 6	5 0
31¾	TRING	7 25	9 35	..	10 48	12 25	2 25	3 35	6 25	7 36	9 56	9 6	8 0	7 0	5 6
41	LEIGHTON	7 50	10 0	..	..	12 50	2 50	4 0	6 50	8 0	..	12 0	11 0	9 0	7 6
	BLETCHLEY	..	10 16	..	..	..	..	4 16	..	8 15	..	13 6	12 6	10 6	8 6
52¾	WOLVERTON	8 16	10 30	11 0	11 41	1 16	3 15	4 30	7 16	8 30	10 54	15 6	14 0	11 6	9 6
60	ROADE	..	10 53	..	..	..	..	4 53	7 40	..	..	17 0	16 0	13 6	10 6
63¼	BLISWORTH	8 50	11 5	..	..	1 50	3 50	5 5	7 50	..	..	18 6	17 0	14 0	11 6
69¼	WEEDON	9 6	11 25	11 50	12 33	2 6	4 6	5 25	8 6	..	11 50	20 6	18 6	15 6	12 6
76¼	CRICK	..	11 45	..	..	..	..	5 45	..	..	..	22 0	20 0	17 0	13 6
80¼	RUGBY	9 40	12 5	..	..	2 40	4 40	6 5	8 40	..	..	24 6	22 6	18 0	15 0
80¼	BRANDON	..	12 20	..	..	..	..	6 20	..	..	..	26 0	24 0	20 0	16 0
94	COVENTRY	10 10	12 36	12 50	1 36	3 10	5 10	6 35	9 10	..	1 0	27 6	25 0	21 0	16 6
100¼	HAMPTON	10 35	1 0	1 16	..	..	..	7 0	..	..	..	29 6	27 0	22 6	18 0
112¼	BIRMINGHAM	11 20	2 0	2 16	2 30	4 30	6 30	8 0	10 30	..	2 0	32 6	30 0	25 0	20 0

There is a Mixed Train from Aylesbury to London at 11 a.m., and one from London to Aylesbury at 3 p.m.

SUNDAY TRAINS.—Times of Departure, Mixed 8 a.m, Mail* 9¼ a.m, Mixed to Wolverton 6 p m, Mail,* mixed 8¼ p.m.

Children under Ten Years of age, Half-price. Infants in arms, unable to walk, free of charge.—Soldiers *en route* are charged under a special agreement.—Dogs are charged for any distance not exceeding 30 miles, 1s.; 55 miles, 2s.; 86 miles 3s.; and the whole distance, 4s. No dogs allowed to be taken inside the Carriages.

Carriages and Hackes should be at the Stations a quarter of an hour before the time of departure, and they cannot be forwarded by any train unless there, at the least, five minutes before its time of departure, which time is punctually observed, and after the doors are closed no Passengers can be admitted.

To guard against accident and delay, it is especially requested that Passengers will not leave their seats at any of the Stations, except Wolverton (half way), where ten minutes are allowed for refreshment.

A Passenger may claim the next corresponding train, if the number on his Ticket, and when not numbered he may take any seat not previously occupied.—No Gratuity, under any circumstances, is allowed to be taken by any Servant of the Company.

Ten minutes are allowed at the Wolverton Central Station, where refreshments may be obtained.

The Trains marked with an asterisk (*) are in communication with those of the Grand Junction Railway; sufficient time being allowed at the Birmingham Station, where refreshments are provided, and waiting rooms, with female attendants.

complete his arrangements before the doors were closed to prevent further entrance. If he were travelling third class, he had, in many cases, to rise before daybreak in order to catch the solitary third-class train of the day. Arrived at the station he gave his name to the clerk, to be written on a large green paper ticket, for which on some lines a metal badge bearing a number and the name of the station was substituted. On receipt of this he had to pay his fare, which usually was nearly twice as much as it would be at present. Within the station things were well arranged. There were waiting-rooms 'with newspapers on the table and all the conveniences of the toilet.' At the junctions these were particularly necessary, as long stoppages were not only frequent, but usual. If his ticket were not numbered, and his seat consequently assigned, the passenger chose his place in the train; but if he wished to smoke it was to no purpose that he looked out for a smoking-carriage, since smoking was allowed neither in the station nor in the train.[1] A first-class passenger had a comfortable carriage, but were he a great country magnate it was probable that he would prefer to travel in his own carriage placed on a railway truck. The second-class carriages were often only closed at night. The third-class passengers at first were packed into mere trucks, and it was considered a great concession when they were placed in carriages which had roofs, but which, with their open sides, afforded small protection against the inclemencies of the weather. If they wanted to go from London to Liverpool, they had to spend two days on the journey, and even a second-class passenger needed to sleep at Birmingham or proceed at first-class rates. When all had entered the train the tickets were carefully inspected. The moment of departure was a solemn

[1] On one line, namely, from London to Southampton, the penalty for smoking was 10*l*.

one. Even then the hearts of some failed them, and they would refuse to proceed; others abandoned themselves to the dangers and unknown terrors of the railroad with a sense of reckless daring. The train slowly left the platform; in many cases it was drawn out by a stationary engine, and coupled with its locomotive after a temporary halt. The journey was made at the pace usually of some nineteen miles an hour, but in some cases of twenty-five miles. The passengers could do nothing but look at the scenery, and think of the new invention with its conveniences and dangers. They crossed a viaduct and trembled to think of the height they were at. They plunged into a tunnel which imagination had invested with every terror, from the certainty of a fatal cold to that of a living burial. There were frequent stoppages if the train were not an express; in that case it stopped only at the first-class stations, otherwise at nearly all, with a delay varying from five to ten minutes in length. Occasionally a train coming the opposite way would be met and passed to the astonishment, and often the alarm, of the passengers, but this did not happen very often during the journey, for the trains were run at long intervals. This infrequency it was which prevented accident, for as there was little or no signalling, safety was only secured at the cost of inconvenience. At last the terminus was reached, and the passengers dispersed, pleased with the novelty of the journey, but relieved that they had escaped the perils which it involved —competent, if they were literary in taste, to describe it in a book; otherwise to make it the substance of a letter.

Nature of the progress during the third period.

It would be both tedious and unprofitable to simply recapitulate the various points in which improvement has been made, and it is enough to say that progress has been developed in three chief directions. The railways of the

country have been systematised, safety has been assured, and the convenience of passengers has been consulted.

(1) Adoption of a uniform system.

Till 1845 each railway was an entirely separate body, which could construct its rails on a gauge different from that adopted by other companies. In that year occurred what was the critical moment in what is commonly known as the Battle of the Gauges. The line from Bristol to Gloucester was laid down on the broad gauge. Both the Great Western, with a gauge of 7 feet, and the Midland, which had adopted the narrow gauge of 4 feet 8½ inches, were anxious to secure amalgamation with the company that owned it. The Midland won, and with its victory the predominance of the narrow gauge was secured, to be confirmed in the next year by Parliamentary enactment. This was, indeed, but a single step in the process which ordered the various railways into a well-connected system. The appointment of the Railway Commissioners necessarily exerted influence in the same direction, and this influence was strengthened by the transfer of their powers to the Board of Trade in 1851, and the consequent recognition of the regulation of railways as a function of the Executive Government. If such a uniform system were to be adopted and fully utilised, it was necessary to provide some means for meeting the difficulties which were involved in operations based on mutual running rights and through-booking. This want had already been foreseen. In 1841 a Clearing-house had been established, and in 1850 the Clearing-house Act was passed which defined its functions. It was to apportion the receipts for tickets which extended over two or more lines, and to provide for luggage lost in a train moving under similar conditions. Further, its aid was invoked to determine the amount due from one company to another for the use of roadway or siding.

The gauge.

Board of Trade.

The Clearing-house.

The best illustration which can be afforded of this new

order and regularity is the growth of railway literature. Every company now provides its own time-table, and all are systematised in 'Bradshaw,' which presents a wonderful epitome of the intricate, but minutely adapted, means of communication now available. In 1839, the railway information could be contained in six pages, now it occupies over four hundred. Then no index was necessary, now the index is over thirty pages in length. The literary position of the book is unique. It is the one book in which all people feel interest, though many profess themselves incapable of its study. What a new world that is, of which Bradshaw and Hendschel are the interpreters, and where the geography of the railroad has superseded in importance that which describes the height of mountains and the courses of rivers!

This alteration summed up in 'Bradshaw.'

Such alterations implied, if they did not cause, an increase of traffic, which would of itself add to the risk of accident. But in this second respect improvements had been made which not only averted the possible peril, but even rendered travelling under the new conditions of rapidity safer than it was in those early days when trains were unfrequent and crossings and sidings rare. On the first railways the system of signalling, if it may be said to have existed at all, was of a most rudimentary character. In one place the whole apparatus consisted of a board, which was turned on one side to give permission to the train to proceed, and which at night was superseded by a bonfire of coal. At another station the presence or absence of a candle in a window signified to the driver whether he was to stop or go forward.[1] Even in 1834 an attempted improvement only consisted in the suspension of a lamp to a high post. In the few years at the beginning of the reign fresh trials were made. The engineering world was

(2) Increased safety of railways.

Signalling.

[1] *Our Iron Roads*, pp. 274, 275.

37290

interested in devising some efficient method. On the Greenwich line the directors, 'by the erection of a lighthouse and by the establishment of a code of signals,' did their best to obviate all dangers.[1] From such small beginnings as these was the system of lever signals brought to a perfection, which is well illustrated by the fact that at Cannon Street in the present day no fewer than 108 signalling operations have to be performed every hour—that is, one in every thirty-three seconds. But this is not the only improvement. The block system has been introduced, whereby no train is allowed to enter on a given length of line before it is clear. On the Metropolitan Railway, for instance, and owing to the adoption of this method, trains are allowed to follow each other at so short an interval as that of three minutes. In foggy weather security is further assured by the constant use of explosive fog-signals. And if the safety of the line has been thus attended to, other means have been adopted to bring the train more completely under the control of the driver. The greater the speed, the more need there is of some efficient means of checking it. Brakes were, of course, in use before the railways were laid, but they were not of such a kind as could be well adapted to the new requirements, to meet which Stephenson brought out an invention whereby the wheels of the engine could be stopped, and other means, such as the chain-brake, were employed to place another portion of the train under the control of the guard. But it was not until the comparatively recent date of 1875 that this subject met with the consideration it deserved. In that year trials were made at Newark with trains regulated by different kinds of brakes, when it was proved that a train of above the average weight, and travelling at the rate of fifty miles an hour, could be stopped in 260 yards if fitted with a continuous brake, while if it were furnished only

Brakes.

[1] *Parl. Papers*, 1839, vol. x.

with the old brake it would have to go some three times the distance before it could be brought to a standstill. Since then, if they are to conform with the requirements of the Board of Trade, all trains must be supplied with a self-acting and continuous brake. In one other respect there has been an important change. That the complete isolation of separate compartments offered certain opportunities for the commission of crime could scarcely escape early recognition.[1] In those instances where open cars are in use, and the whole train thus placed in a condition of publicity, under the immediate supervision of the conductor, this danger does not exist. But this system has not found favour in England, and so other, though less effective, safeguards have been devised. Since 1868, and partly no doubt in consequence of the somewhat excessive amount of public attention directed to this subject by the sensational murder of Mr. Briggs in a previous year, each train has been furnished with a means of communication with the guard, either in the form of a cord or an electric bell. It is true that there has been little resort to these in cases of emergency, and almost equally true that on many occasions all attempts to employ these means have been ineffectual, but it is by no means improbable that the bare possibility of their employment has precluded many acts of violence which might otherwise have been attempted.

Communication with the guard.

It is satisfactory to find that these changes and improvements have not been without result. The proportion of deaths occasioned by causes beyond the control of passengers, to the number of those who have travelled, has diminished, not only steadily, but with a decrease that has been more perceptible in later than in former years.

The nature of railway risks.

[1] Chambers, *About Railways*, p. 41.

Table of Passengers Killed from Causes beyond their own Control.

Years	Tota l number killed	Annual average in proportion to number of passengers
1847–49	36	1 in 4,782,188
1856–59	64	1 in 8,708,411
1866–69	91	1 in 12,941,170
1876–79	148	1 in 23,839,030
1882–85	66	1 in 59,286,890

The nature of the risk may be shown in another way. From a comparison between the number of accidents and the average train mileage, it may be deduced that a man, in order to secure his death, must begin to travel as soon as he is born, and proceed day and night at the rate of 20 miles an hour for 466 years. Even to make the risks from railway travelling equal to those from general causes, he must pursue the same practice for nine years. Very few people have time even to get injured on the railway.

The real safety of a railway.

This would be the position of the passenger were he exposed whilst travelling to the ordinary risks of life. In many cases, however, he is relieved from these; for instance, he cannot be run down by a cab or knocked over by a runaway horse. As the total fatal accidents from other vehicles exceed in number the total incurred on the railway, it is quite evident that the latter offers a new immunity both to passengers and to officials. The year 1885 presented a singularly fortunate record. Only six fatal accidents happened to passengers from causes beyond their own control. There was another mode of locomotion which was far more dangerous. In no less than seven instances fatal consequences followed on accidents to the occupants of perambulators, and as these had in no instance passed the maturity of their second year it may be presumed that their own negligence was not in fault.

It remains to consider those alterations which have been

made with more direct reference to the convenience of the public. Of course, such has been the result of all improvements in railway organisation, but in these instances the effect has been more immediate and the utility of the change more apparent. The two chief features of interest present themselves in the increase in the speed and number of express trains and the fresh advantages offered to third-class passengers.

(3) Increased convenience.

The English express service is unique, since the expresses which are to be found in other countries are not run with sufficient frequency to form a general service. It has been developing throughout the whole period. Though there were no trains in 1841 which made their whole journey at a speed of 30 miles an hour, in 1847 some seven trains in the day attained a journey speed of 40 miles or over. For some years there was gradual progress, and in 1877 it might be said that of the long-distance trains, whether the slow or fast, running between the most important centres, some 3 per cent. had a speed of 45 miles, while in the present year, on the basis of a similar calculation, 6 per cent. travel at 45 miles or over, and in the case of other 21 per cent. the journey speed exceeds 40 miles. The total number of express trains, traversing long or short distances, is 409.[1] Their average journey speed is 41⅗ miles and their running average 44⅓. Even this furnishes but an imperfect idea of the rapidity which can be attained. The following are the fastest long-runs accomplished :

(a) The natural history of the English express.

Its average.

Its potentiality.

Grantham to London, a distance of 105¼ miles, at a speed of 53½ miles the hour.
Swindon to London, „ 77¼ „ 53¼ „

The great centres are bound together in this system. The communication between London and thirty-two towns is

[1] For this and following calculation see *English Express Trains*, by E. Foxwell, pp. 112, 114, &c. In these two cases the calculations were made from the tables of August 1883.

maintained in each case by ten or more daily expresses. Manchester is connected with the metropolis by 42 expresses, Nottingham by 35, Leeds by 28. Similarly, 27 expresses run between London and Liverpool, and 22 between London and Bradford, while in the case of York there are no fewer than 20. These are only isolated instances, and do not form an enumeration of all those towns which have the most frequent expresses. Beyond the limits of England, it is some satisfaction to observe, the service continues. Between London and Edinburgh there run 16 express trains, and between London and Glasgow 12.

(b) The encouragement of third-class traffic.

The fact that nearly all these trains carry third-class passengers reveals a difference between the railway system of the present and that which existed at the beginning of the reign, for then third-class passengers were considered a nuisance, and deterred from travelling by every possible inconvenience. They had to travel with the goods train in waggons, and were conveyed rather because of Government regulations than from any idea that they could be made a source of profit. Yet, notwithstanding all the discouragements offered to third-class traffic, it increased until its returns were greater than those of either first or second class. Its growing importance was recognised at last, and in 1872 the Midland began to convey third-class passengers by all their trains, with so successful a result that two years later they discontinued the use of second-class carriages. The effect, especially of the former step, on the entire railway system of the country has been remarkable, and the following figures reveal the extent of the change both before and after these events. The receipts from the traffic of the various classes are calculated per mile of the length of railway open in the respective years.

Year	First class	Second class	Third class
	£	£	£
1858	322	379	386
1870	254	317	481
1875	284	231	779
1880	220	197	827
1884	185	165	933

Thus the third-class receipts, far from being unimportant, form nearly 73 per cent. of the total receipts from passenger traffic.

A statistical summary.

It is very difficult to form any sufficient and definite conception of the magnitude of the change which the means of communication have undergone during the past fifty years with consequences everywhere apparent. Commerce and society bear its impress, but statistics represent it inadequately and summarise results from which many items are missing.

The increase of travelling.

When Porter calculated the traffic by coach just before the rapid extension of the railways which began in 1836, he estimated it at 358,295,652 miles travelled by one person.[1] With reference to the population of the time this would mean that every person travelled 13 miles. The average fare per mile was *5d.*, and the speed might be reckoned at 9 miles per hour. Now each inhabitant of the United Kingdom travels 148 miles at the rate of 25 to 30 miles an hour, and at the expense of $1\frac{1}{4}d.$ per mile. Thus eleven times the distance is accomplished in not quite four times the time and at not three times the cost. Could each man expend only as much money as formerly, he would even then travel 52 miles. Could he not devote more time, he could go 39 miles and save *1s. 6d.* But if his journey were only 13 miles in length, he would save some *5s.* and accomplish it in half an hour. The total advantage is three-

[1] *Progress of the Nation*, p. 302.

fold. He can travel farther, faster, and cheaper. If these be taken together, the convenience offered for a journey in the present day bears to that in the past the ratio of eleven to one. In point of fact, each person may be said to travel some eleven and a half times the distance that he would have done in 1837, and to perform every mile of the journey in little more than a third of the time and at one-fourth of the cost formerly required.

The growth of speed.

In one respect the foregoing account fails to indicate the full superiority of the modern system. For long journeys and between important towns trains are run with unusual frequency and rapidity. The following table, compiled from the 'Bradshaws' of the respective years, represents the increase of speed on long-distance journeys from the earliest times, including both fast and slow trains. The number of stations open throughout the United Kingdom is also added.

Table of Long-distance Trains distributed according to their various Speeds in percentages.

Year	Under 20 miles	20 and upwards	25 and upwards	30 and upwards	35 and upwards	40 and upwards	45 and upwards	General average for long distance trains	Number of stations open
1839	28	65	7	—	—	—	—	19	—
1847	12	43	33	3	5	4	—	22¾	426
1857	9	22	25	22	19	3	—	26½	2,722
1867	5	20	26	25	16	8	—	27½	4,379
1877	7	14	21	25	19	11	3	29	5,383
1887	4	15	15	21	18	21	6	31	6,230

Thus, during the past fifty years, the average speed of long-distance trains has risen from 19 to 31 miles. But if express trains be taken apart, their average is 41⅗. This higher speed is rendered of greater utility by the disproportionate increase of urban population. In 1837 the rural and urban populations were nearly equal, but now nearly two-thirds of the people dwell in towns. The fast trains on the

Midland from London to Manchester, which stop only four times on their route, connect populations which together amount to between five and six millions.

Bearing of these changes on life.

These are the details of the picture; but it is easier to understand the change effected by the railway if we reflect upon its influence on the incidents of common life. Again, it is necessary to notice the connection between the railway system and the distribution of the population. It plays its part both as cause and as effect; but in every instance it has tended to give permanence to arrangements which might otherwise have been of a temporary character, since a railroad, when once constructed, offers enormous advantages and exerts an influence as a monopoly, which it is hard to supersede. The extension of the Metropolitan Railway in the suburbs of London is a beacon-light to allure population. It has, of course, been the policy of the companies to encourage such settlement. When the London and Birmingham Railway had been open seventeen years it was found that, within a certain area between the metropolis and Tring, the total amount expended in new buildings was only 22,000*l.* A free pass was offered to all who would build a house, and within eight years the expenditure amounted to 240,000*l.*

Distribution of population.

The questions of the future

This account of the past of railways should properly be supplemented by a few remarks as to their probable future; but in a sketch necessarily so limited as the present, it is only possible to direct attention to two circumstances which seem to foretell considerable changes.

(1) Hitherto the rate of locomotion has been measured by the power of steam, while soon it may depend on the development of electricity.[1] So keenly do fire, water, earth, and air compete and combine in the service of man.

[1] The electric railway between Portrush and Bushmills is six miles in length. On the level the cars attain a speed of twelve miles an hour. The

(2) With regard to the legal position of the railways; the complaint of the inequality of rates is a demand for State revision and interference. As yet the Board of Trade does not possess sufficient power to compel the effective observance of the requisitions which it makes in the public interest. Still more important is the gradual decrease in profits, for the working expenses tend to absorb an ever larger proportion of the receipts. It is difficult to see how even the call for economy can be met without the introduction of alterations which would necessitate immediate State control, if not State ownership.[1]

The importance of goods traffic.

Picturesque though the details of passenger traffic are, it must not be forgotten that the carriage of goods forms an important, financially the most important, function of the railways. The goods conveyed by the railways have increased enormously. In 1842 they amounted to 5,129,000 tons, while in 1885 the number of tons was 257,000,000. The receipts from their carriage now form 53 per cent. of the total receipts, and amount to upwards of 35,000,000*l.*, while in 1842 they were but 1,072,313*l.* In like manner the coasting trade of the United Kingdom shows a vast increase. In 1836 the total shipping entries and clearances coastwise amounted to 21,100,000 tons, while in 1885 they were 51,813,000, The entries alone have risen from 10,300,000 tons to 27,031,000. As to canals, secondary as is the part they now play in the machinery of transport, the goods carried on them amount to quite half as much again as in 1838. According to the scanty returns furnished, the tonnage on the more important canals was 12,700,000 at that date, while in 1868 it was 18,000,000. These figures show how entirely the transport of goods is

electric force is communicated by a third rail, and is not contained in the engine.

[1] Cf. *Railway Administration*, an anonymous pamphlet. Geneva, 1886.

dependent upon the efficiency of the railway system. If the tonnage of the goods be distributed equally among the respective populations at the beginning of the reign and at the present, the weight forwarded by each person may be said to have increased from 1 ton 6 cwt. to 9 tons.

Thus, in the consideration both of this question and of the facilities of social intercourse, it becomes necessary to take notice, on the one hand, of the progress of the shipping industry, and, on the other, of the development of postal and telegraphic communication. The carriage of goods is affected most closely by the growth of the mercantile navy, while the organisation of the Post Office provides, as do railways, for communication between person and person.

(2) Navigation.

History of mercantile navy.

The history of merchant shipping during the past half-century would be important, were it nothing more than a record of two important changes with their consequences. Iron-built ships have superseded wooden ships, but are in their turn being replaced by those built of steel. Steam-vessels have been introduced, and during the last twenty years have increased so rapidly that their tonnage exceeds that of sailing-vessels. This twofold alteration from wood to iron, and from sail to steam, exerted a special influence on the trade of England, since ships began to be built of material of which she had, if not a monopoly, still the most plentiful supply. The proximity of her coal and iron fields gave her a peculiar advantage, which the fresh importance of steam power increased—with what results will be shown farther on. So early as 1819 the steamship 'Savannah' had crossed the Atlantic from America; but neither this nor other experiments seemed sufficient to justify any extravagant hopes, for even in 1837 there were

grave doubts as to the expediency of employing engines of 440 horse-power. It was not till the next year that the importance and feasibility of steam communication were established by the successful voyages made to America by the 'Great Western' and the 'Sirius.' For a long time, indeed, after this the use of steam-vessels was chiefly confined to coasting and passenger traffic, and the American sailing-packets contested the Atlantic against the Cunard Company, till the establishment of the rival Collins Company put an end to the struggle and served as an acknowledgment of their defeat. Many and important improvements had to be made, of which the greatest was formally recognised when, in 1843, the 'Great Britain' was fitted with a screw. But, despite the progress, there was much cause for discontent in the condition of the British mercantile navy. The Navigation Laws procured it a safe monopoly, and its sailors consequently deteriorated in character and were outrun in intelligence by the crews of foreign vessels. Such, at least, is the conclusion to be drawn from the answers received in consequence of a Foreign Office circular of 1843, which show that the character of the English sailors had declined, while that of the sailors of foreign nations had improved, a circumstance which we need hardly wonder at when we remember that there was no regular education necessary, and no Government supervision which might compel a regard for seamanship and skill. The creation of a new Government department was advocated; but this alone would not have achieved the desired improvement, which depended on a far more fundamental alteration in the commercial law of the country. The strict maintenance of the Navigation Laws was often, indeed, a matter of considerable trouble. With regard to America considerable relaxation had been necessary, and in other instances positions of commercial hostility were compromised by com-

Voyages of the 'Great Western' and the 'Sirius' establish the power of steam.

Bad condition of the mercantile navy,

remedied by new Government supervision,

plex reciprocity treaties. The introduction of steam and the rapid progress of shipping occasioned further difficulties. It had become convenient for many nations to ship their goods at ports which were not in their own territory. On the other hand large ship companies had been formed in which many of the shares were held by foreigners, and yet it was declared that their ships fell under the definition of 'British.' Moreover, the instinct which had been developed throughout the Free-trade conflicts was opposed to a system so largely infected with the capital sins of monopoly and restriction. So, notwithstanding the opposition of the shipowners, who actually demanded that vessels built in the colonies should be reckoned as foreign, a Committee was appointed in 1847; and in 1849, amid prognostications of ruin and disaster,[1] the Navigation Laws were repealed. By this action foreign nations were encouraged to hope for a large share in the carriage of British commerce. They increased their stock of ships, while a moderate increase took place in England; so that it became evident that only exceptional causes of demand would suffice to keep all this augmented tonnage in employment. These, in point of fact, existed. The movements consequent on the epoch of 1848 and the development of the British colonies combined with the gold discoveries to create an urgent demand for shipping of all kinds. Before this impetus had time to exhaust itself the Crimean war gave a new opening to activity.

and the abolition of the Navigation Laws.

During these few years, however, events had been taking place which did not tend to assure the success of British shipping. The refusal of England to issue letters of marque led the way to the clauses agreed upon at Paris in 1856, by which privateering was abolished and security granted both to hostile goods carried in neutral ships and neutral goods carried in hostile ships, provided that such

Yet unfavourable position of British shipping after the Crimean war.

[1] Hansard, March 9 and 12, May 8.

goods were not contraband of war. But notwithstanding the seemingly moderate nature of these changes the United States refused their consent to the agreement, and this action, in connection with their geographical position, made it clear that in case of a general European war, in which England might be involved, a large part of her carrying trade would be transferred to American ships. Moreover, after the Peace of Paris, the chief cause which had led to the demand for ships vanished. The depression, long delayed, was felt with redoubled effect, and the last few years of the decade which dates from the repeal of the Navigation Laws were a time of distress for the shipping interest. At the time when that repeal was being urged, there had been a demand that the burdens imposed on the British shipowners should be removed; and, as no such removal of burdens had followed, it began to be asked for again. The grievance now met not only with attention but with partial remedy.

Satisfactory change during the next few years.

The next few years produced an alteration which could not have been anticipated by the most sanguine. The Civil War in America threw not only the trade but a great part of the shipping of the United States into the hands of England. In 1860 the American tonnage employed in the direct trade between that country and England was 2,245,000; in 1865 it had fallen to 484,000,[1] while the British tonnage had increased from 945,000 to 1,853,000. This was, of course, not the sole result. In the general carrying trade the Americans ceased to be our rivals. In another direction, too, quite independent of political events, there was a further change which was to be of the greatest advantage, for this was the time when steamers began to supersede sailing-vessels. In 1860 the tonnage of British steam entered and cleared in the foreign trade was nearly 5,000,000, while in

[1] *Stat. Soc. Journal*, xxxv. 218, 219.

1865 it was upwards of 9,000,000. Both in the production and the ownership of these vessels England shows an unusual superiority, and many of the steamships which are owned by other nations have been produced in her yards. Of the importance of this industry, the rapid growth of shipbuilding on the banks of the Tyne, the Wear, the Humber, and the Clyde furnishes abundant proof, while the docks of Liverpool, London, and Grimsby, to single out for notice a few of the most prominent, show how greatly the condition of the country is dependent on its marine supremacy.

Constitution of Marine Department of Board of Trade,

During the period which has elapsed since the important events of 1849, many attempts have been made to control and direct the organisation of the mercantile navy. The constitution of the Marine Department of the Board of Trade in 1850 furnished, as it were, an instrument for reform. Under its auspices local Marine Boards were established, and examinations strictly conducted. But there were further necessities. Safety was assured neither for passengers nor sailors. The state of emigrant ships was peculiarly bad. This was met by the Passenger Act of 1855, while the Merchant Shipping Act of the previous year had made definite provisions for registration and security. Legislation on the subject, indeed, existed already, and was so complicated that, as one shipowner said, it was almost impossible to despatch a ship without infringing some law. The safety of the seamen was rightly made a matter of public concern; but, though this has never been denied, it still remains for the statesmen of the present day to devise some means which may secure that end, and yet not unduly interfere with individual enterprise and management. Neither Mr. Plimsoll's agitation of 1875 nor Mr. Chamberlain's recent Merchant Shipping Bill provided such a settlement.[1]

and subsequent legislation.

[1] Cf. W. S. Lindsay, *History of Merchant Shipping.*

Table showing Tonnage of Vessels entered and cleared at Ports in the United Kingdom from and to Foreign Countries and British Possessions.

Marine statistics

Year	Total tonnage	Increase per cent.	British tonnage	Increase per cent.	Total steam tonnage	British steam tonnage	Percentage of British to total
1836	7,061,069	—	5,037,050	—	432,683	398,221	92
1846	12,415,586	76	8,688,148	72	1,319,226	1,134,608	86
1856	21,589,049	74	12,945,771	49	3,896,175	3,290,619	84
1866	31,262,450	45	21,255,726	63	10,761,413	9,484,594	88
1876	50,784,902	62	33,441,979	57	27,169,037	22,664,505	83
1885	64,281,522	27	46,389,055	39	49,509,867	39,794,162	80

N.B. Increase of total shipping as above during period, 810 per cent.
Increase of British shipping „ „ 821 „

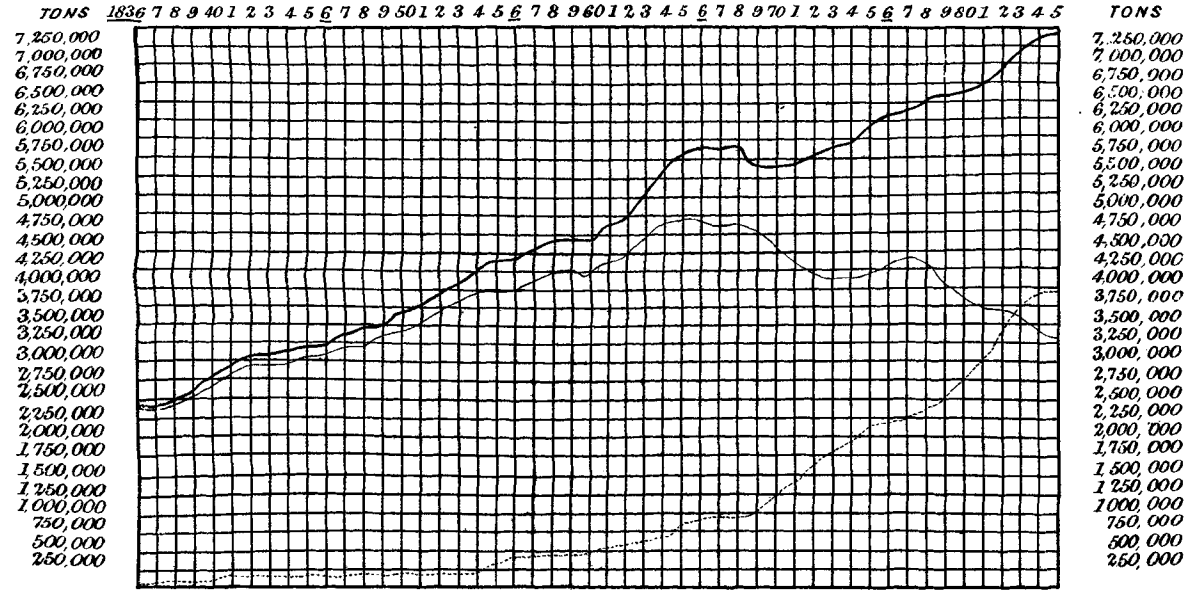
Table exhibiting Mode of Progress in British Shipping in decennial periods 1836–1885.

Year	Steam-vessels		Sailing-vessels		Average size of	
	Tonnage	Number	Tonnage	Number	Steam	Sailing
1836	67,697	600	2,282,053	19,788	113	115
1846	131,256	963	3,068,529	23,808	136	129
1856	386,462	1,697	3,980,494	24,480	228	163
1866	875,685	2,831	4,903,652	26,140	309	188
1876	2,005,347	4,335	4,257,986	21,144	466	201
1885	3,973,483	6,644	3,455,562	17,018	598	203

and their significance.

The main features of the change which has occurred during the past fifty years are easily discernible. Iron has been substituted for wood in construction, and sailing-vessels have been largely superseded by steamers. Of the tonnage of British shipping entered and cleared at ports in the United Kingdom in 1836, steam tonnage formed only some 8 per cent., while now it exceeds 85 per cent. of the total. Then, indeed, of all the steam tonnage entered and cleared at these ports, England claimed nearly the whole; but even now her share amounts to 80 per cent. Her position with regard to the total tonnage returns is equally satisfactory. While they have increased 810 per cent. from 1836 to 1885, her portion has increased 821 per cent. But these bare returns do not reveal the full nature of the

DIAGRAM EXHIBITING THE GROWTH OF SHIPPING TONNAGE REGISTERED AS BELONGING TO THE UNITED KINGDOM, DISTINGUISHING BETWEEN SAILING AND STEAM TONNAGE.



——— Curve denoting increase of total tonnage
——— Curve denoting increase or decrease of sailing tonnage
..... Curve denoting increase of steam tonnage

advance that has been made. Every substitution of a steamer for a sailing-vessel means an increase in activity, and consequently of business. Besides, the construction of the sailing-vessels has been improved, and they, on their part, are able to accomplish a much greater amount of work. Each steam ton may be said to have four times the carrying power of a sailing ton. On such a calculation the carrying power per ton has increased nearly two and a half times; and even this reckoning, though it takes into account the increase in speed, does not express the additional advantage of certainty which is assured by the employment of steam power. Contrary winds may delay a sailing-ship for weeks; it must be very bad weather indeed that delays an Atlantic steamer so much as a day.

The political importance of British shipping.

In one way these alterations have had an effect beyond that of promoting commercial intercourse and extending knowledge. At the beginning of the reign the sphere of English foreign politics scarcely extended beyond Europe. But throughout the century, and more especially since 1837, countries have grown into importance which lie beyond these limits, and which, while strong in their present resources, give promise of greater possibilities. Their institutions and politics differ from those of the older nations. They are democratic, and the basis of their strength is commercial. Were it not for the improvement in the means of communication, it is quite possible that these two worlds of feeling and of politics might have continued apart; now each year brings them more closely in contact. It is a matter of interest to consider what will be the effect on the relative positions of the nations if the balance of power be thus modified. Of all European powers, England alone has a strong stake in the New World, and every change which facilitates intercourse is to her advantage. It strengthens the two portions of her empire by union. It brings her

nearer not only to her own colonies, but to the great Republic with which she has so strong a sympathy of race.

(3) Posts and Telegraphs.

Posts in England before the reforms.

The condition in England before the postal reforms of 1840 scarcely differed from that of a country whose Government might choose to tax conversation and to construct a graduated scale according to the tone of voice. There was a tax on all correspondence, and the tax was increased according to the distance at which the correspondents dwelt; yet there was no loud complaint against the Government which had first claimed the right of transmission as a monopoly, and then made its performance an opportunity for taxation. The grievance was in reality very great. There was no uniformity of charge, the rates of postage varying from 4*d.* to 1*s.* 8*d.* The organisation of the means of transit was equally defective; of two letters posted between five and six in the evening to Wolverhampton and to Highgate, the former would be delivered first. Under favourable circumstances a letter might be sent from London to Hampstead in ten hours. Some six thousand of the letters, arriving in London by the morning mail, had to remain in the Post Office all day for want of the morning despatch.[1] There was certainly no financial advantage gained by the continuance of this entire system, for even the revenue from the Post Office had decreased. Had it risen in proportion to the increase in population, it should have amounted to half a million more than the sum it actually reached. As a means of taxation the old postal system produced the maximum of inconvenience and the minimum of profit. In other respects it was positively injurious. Every mode of evasion was practised, and there

[1] *Life of Sir R. Hill*, p. 42.

was an actual premium on dishonest dexterity. Letters were smuggled by private firms, franking was manipulated as a mode of business, and newspapers or marked letters supplied the necessary information to a clever recipient before they were withdrawn because of his refusal to pay postage.

Many of these points suggested themselves to the postal reformer, Sir Rowland Hill, whose important pamphlet on 'Postal Reform' appeared in 1837. After showing by a careful analysis that the expense entailed by increased distance was comparatively small, and that the very heaviness of the tax discouraged the commerce of the country, he proceeded to point out the financial inutility of the postal system, as it then existed, and concluded by recommending the adoption of a uniform rate of postage with prepayment. Sir Rowland Hill.

The number of letters delivered in that year may be estimated at upwards of 80,000,000.[1] It is now about 1,400,000,000. The scantiness of the facilities provided by the department may be gathered from the fact that it was only a few years before that in London offices had been opened at Vere Street, Charing Cross, Bow, Lombard Street, and Southwark.

The cause of reform progressed slowly. It was encouraged at the Treasury but opposed at the Post Office, where the permanent officials felt so confident of its failure that they gave every facility for the new experiment, in order that its defeat might be more final. In 1839 the charge for London letters was lowered to one penny. In 1840 the penny post was extended to the United Kingdom, and the use of stamps introduced. From 1840 to 1884 no fewer than 31,300,000,000 stamps have been issued.[2]

The experiment was wholly successful. There was an

[1] Cf. estimate in Porter's *Progress of the Nation* with that given by Sir R. Hill in *Postal Reform.*

[2] Article 'Post Office' in *Encyc. Brit.*

immediate increase in the amount of traffic, while within a few years, thanks to the facilities afforded by the new railways, the revenue proved itself amply sufficient for the expenditure. Soon additional mails had to be provided, and the time for posting letters was extended. In 1855 the Book Post was organised, and during the same year letter-boxes were placed in the streets. All these changes were made with the object of facilitating correspondence.

Other changes.

But during the succeeding years such a policy was supplemented by another, which aimed at extending the sphere of the Post Office into other departments of life. In 1861 Post Office Savings Banks were established. The Money Order Department had been officially sanctioned in 1838; in 1881 Postal Orders were first issued. Further facilities were furnished by the addition of a Parcel Post—one of the few improvements which we have adopted from abroad, and one carried into effect by the late Mr. Fawcett—and by the introduction of post-cards, the latter of which changes took place in 1870, and the former in 1883. The advantages thus provided have been readily utilised. In 1885 the number of money and postal orders issued was upwards of 30,000,000, while their united value was over 32,000,000*l.* Of post cards there were delivered 172,000,000, while the number of parcels carried through the Parcels Post was 25,000,000, with a total weight estimated at over 23,000 tons.

The telegraphs.

In approaching the subject of telegraphy, perhaps the most obviously striking mark of difference between the last and any preceding fifty years, a short digression is necessary.

Despite the claims of various inventors, there are few matters so well ascertained as the real priority attaching to the patent taken out by Cooke and Wheatstone on July 25, 1837, for this date really marks the conclusion of the long

series of experiments by which they proved the validity of the method they proposed to adopt.

The friends of Morse, the American inventor, asserted indeed that he had long entertained the notion of the electric telegraph, but this state no doubt was common to him with many others, while it is certain that the first official announcement of his invention was not made till September 27 of the same year. Steinheil, on the other hand, although he had laid a telegraph between Munich and Bogenhausen so early as July 19, amended his system during the next few months, and finally abandoned it for one which was, in fact, a modification of that adopted by Morse. The date of the patent taken out by Cooke and Wheatstone is that of the practical introduction of the telegraph along the railway lines of this country. For two years they employed it between Camden Town and Euston, and then, driven from that line, opened operations along the course of the Great Western. Its value was but little understood, and on the proposal to extend it to Bristol, so strong was the opposition among the directors, that it seemed probable that it would be removed from the Great Western also. It was, however, permitted to remain on condition that it should be extended to Slough and that all railway messages should be conveyed free of charge; in return for this its use was to be permitted the public at the tariff of one shilling. Even then it was but little employed, and only after the arrest of the murderer Tawell through its instrumentality (1845) did the importance of the new invention dawn upon the public mind.

Submarine cables.

More dramatic in incident are the stories which attach to the submarine telegraph. The history of the Atlantic cable stands almost alone as a record of enterprise, failure, and unresting perseverance. The possibility of submarine communication had been rendered clear enough by the success

of the cable between Dover and Calais; but that undertaking was but insignificant compared with the proposal to effect a communication between England and America. Not only was the character of the bottom of the ocean unknown, but it seemed for some time uncertain whether the distance would not preclude the successful indication of messages by electricity. The financial difficulties of the undertaking were easily surmounted by the support of the two Governments and the aid of several great capitalists; and in 1857 the first attempt was made, only to be defeated by the unexpected fracture of the line. Next year, after another abortive attempt, the cable was laid and messages sent from one side to the other. This partial success only heightened the dismay which was felt when the cable ceased working on the very day appointed for its formal opening. This failure and the incidents of the ensuing war threw everything back, but in the long interval which elapsed before another attempt was made the success of other submarine lines went far towards removing the ideas which existed as to the impracticability of the scheme. Political incidents further enforced its necessity, for in the affair of the 'Trent,' to quote the words of the *Times*, 'we nearly went to war with America because we had not a telegraph across the Atlantic.' In 1865, the enterprise was renewed under circumstances vastly more favourable, but this time the cable broke when it had been half laid, and after ineffectual attempts to regain its possession by grappling, the 'Great Eastern,' employed for once in a purpose other than ornamental, was obliged to put back for a further supply of material. The efforts of the next year were crowned with an entire success, for not only was a new cable stretched right across the Atlantic, but the old cable, brought to the surface and spliced, was made to supply the security of an alternative line. This was the crowning moment in the

history of submarine telegraphy. Under the guarantee of success thus afforded, each year has seen the connection of new and hitherto distant countries by cable, till with a total length reckoned at 250,000 miles, they spread on the bed of the ocean a network of communication that binds together nations differing widely in language, in policy, and in interest.

The submarine telegraphs are still the property of private companies; the inland telegraphs now belong to the Government. In deference to principle there was every reason why the conduct of telegrams should be made a monopoly; since the whole difference between a letter and a telegram consisted in the mode of transmission. But the telegraph lines had been laid by private enterprise; they were largely under the control of the railway companies. In 1843 the first public telegraph was opened from Paddington to Slough. By the end of 1845 there were 500 miles of line open. But though the progress made continued to be great, there were frequent suggestions that the telegraph property should be acquired by the State. Such a change would, it was hoped, put an end to the frequent irregularities of which the public had to complain. The demand was enforced by the able reports furnished in 1867–68 by Mr. Scudamore on the feasibility of the project. The objection that it would impose duties upon the postmasters for which they would have neither time nor ability was easily disposed of. A similar opposition had been regularly urged to every previous change, and its complete falsification in other instances almost amounted to an argument in favour of innovation in this.

The question of State acquisition.

In private hands the telegraph system suffered from many of the disadvantages which had been experienced with regard to the Post Office before the era of its reform. There was great irregularity of carriage and an entire absence of uni-

Anomalies and inconveniences of the early system.

formity of rates. To take a couple of chance instances, one telegram to Southampton had taken in transmission three hours and forty-five minutes, and another to Sevenoaks two hours and a half. But more serious difficulties arose out of the conditions which attended the conflicting action of the various companies. There was great competition, and consequent waste, in serving large centres of industry; while, on the other hand, the country districts were almost entirely disregarded. It was calculated that, of the towns with a population of over two thousand, 30 per cent. were well served, 40 per cent. indifferently, while in 12 per cent. the service was bad, and in the case of 18 per cent. there was no service at all. It was true enough that the number of messages had increased; in 1855 they were 1,017,529; in 1860, 1,863,839; and in 1865 they had risen to 4,662,687. Their relative proportion to the number of letters had likewise improved.

In 1855 there was one telegram to			439	letters.
„ 1860	„	„	296	„
„ 1865	„	„	151	„

But then in both Belgium and Switzerland, where the telegraph service was under Government control, the proportion was still greater. The chief reason, of course, was that a Government, not considering profit in the first instance, could cheapen the cost of messages, while as every diminution of tariff tended for some time to decrease the profits of the companies, there could be no doubt that the directors would cultivate dividends rather than beneficence.[1]

The Post Office assumes control with satisfactory results.

At last the alteration was determined on; an Act was passed which authorised the purchase of the property and rights of the companies for the large sum of 7,000,000*l.*, and in 1870 the Post Office assumed the control of the telegraphs. The immediate results were gratifying. Before the

[1] *Reports*, 1867–68, by Mr. Scudamore.

change there were 2,159 offices open; in 1871 there were 3,907 offices. Meantime the number of weekly messages transmitted had risen from 130,000 to 214,000. Even more striking is the progress since achieved.

In 1875 there was one telegram to			56	letters and post cards.
„ 1880	„	„	46	„
„ 1885	„	„	42	„
„ 1886	„	„	40	„

The telephone.

In 1870 the possibility of telephonic communication was not contemplated; but by 1880 the telephone had assumed the position which the telegraph held thirty years before, that is to say, there were numerous private companies in existence which owned different and sometimes rival wires. But though a judicial decision in the autumn of that year confirmed the suspicions that telephonic communication formed part of the monopoly granted to the Post Office by the Acts of 1868 and 1869, the postal authorities in this case declined to avail themselves of their full rights, and offered to grant licences to the various companies under conditions calculated to secure the public advantage. As yet it must be confessed that in the use of the telephone we are far behind the United States, and that all that has as yet been done is to bring the commercial houses situated in the same town into immediate communication.

Statistical summary of the growth of correspondence.

The total improvement made in the means of correspondence during the reign can be summarised in a few sentences. At the beginning the number of letters was some 80,000,000; now the number of post cards alone is 172,000,000, while of letters there are 1,403,000,000. In addition, the number of telegraphic despatches exceeds 39,000,000. There are half as many messages forwarded by telegraph now as there were letters fifty years ago, and over twice as many post cards. If an equal distribution be made among the population of the respective dates,

it may be said that, whereas at the earlier epoch each person sent three letters and received three, now each sends forty and receives forty, while, in addition, there is one telegram transmitted per head. Yet, notwithstanding this, the nett revenue derived from the Post Office has risen from 1,500,000*l.* in 1837 to nearly 3,000,000*l.* in the present year.

The past.

We stand in a singular position at the present time with regard to the past and the future. Long familiarity has made us almost indifferent to the vast changes of the preceding half-century, and, on the other hand, provision for human convenience has been carried so far that we are comparatively incurious as to the future. Only fifty years ago and England was rather an aggregate of isolated districts and disunited towns than one animated, close, compact kingdom. Each city was dependent on the country in its neighbourhood for food supplies, and many a district rich in mineral or agricultural wealth lay neglected because far from seaport or canal. Along the high roads the coaches rolled heavily with their scant passengers and unfrequent mails, while the post-chaise with its quick rattle sounded the prophecy of future bustle amid the quaint provincialism of the scenes through which it hurried. Even within the precincts of the town passengers were ill-provided with means of conveyance, for the cabs were slow and omnibuses rare.

The present.

But the revolutionary hand of time has now wrought a new unity. Although they live in different dwellings, the inhabitants of a town have such facilities of communication that they do not need to leave their houses, but can transact their business by telephone. Outside, the streets are thronged by cabs and omnibuses, and the suburbs can be reached by steam tramcars or railways. Throughout the entire kingdom it needs but a few minutes of delay before a rapid mes-

sage can be received by one man from another. Fifty years ago the intelligence of a national disaster, of the death of a sovereign, of a commercial crisis, rolled slowly through the country like the gradual advance of the tide. Now the statesman, as he is speaking, looks beyond the faces upturned to his, and knows that the audience whose approval he seeks will in a few hours be following the course of his argument and deciding in silence upon their verdict. The merchant, sitting in his office, can study the markets of the world, and, after considering the news hastily transmitted to him by telegraph, he can advise his agents to buy or to sell, exercising a more constant control over the action of the most distant than that which he could formerly maintain in the case of one who lived thirty miles away. Were it not for the numbing effect of custom, every one of us might realise the magnitude of this recent change, as, newspaper in hand, he reads of military events which are happening in another kingdom, or, after glancing over the commercial news, he turns to ascertain the result of a Parliamentary division which took place some few hours earlier in the morning. Then the newspaper is laid aside in favour of letters which were posted the previous evening. Formerly, had the correspondence been equally distributed, each person would have written a letter once in four months, while now he would write every nine days. But if neither telegram nor letter suffice, he can himself travel with the utmost expedition. There is no delay, and a journey of a few hours' duration brings him, not into a new district, but into a fresh part of the united community in which he lives. The monopoly of localities has been weakened, if not destroyed. London, for instance, no longer draws its main supplies from its immediate neighbourhood. 'Fat cattle from Norfolk, meat from Scotland and Devonshire, fish from Scotland, Ireland, and the east and west coasts of England,

broccoli and new potatoes from the Scilly Islands, Penzance, and the Channel Islands,'[1] are thrown rapidly upon the market. Nay, the achievements which roused the wrath of the Roman satirist have been a thousand times outdone; for while in his day the millionaire ate fish from the Caspian, in ours the poor man lives cheaply on the mutton of New Zealand and the wheat of Manitoba. Such has been one of the effects of railways and steamships. They have brought into profitable use mines and forests, quarries and fisheries, harbours and rivers, which were previously inaccessible.[2] Manufacturing towns have grown into existence in places where there once seemed no outlet for commerce. The goods traffic of the country has increased till it now exceeds by eight times its amount in 1837; and a man travels eleven times as far as his father could have done at the beginning of the reign.

It has been the age of Steam, for as yet Electricity has only begun to exert its sway. Arago, when he heard of the predictions made about the railway engine, besought his countrymen 'ne point s'abandonner à des illusions même en matière de locomotives à vapeur;' but the 'long-linked train swept on,' and what seemed an illusion is known as a reality.

[1] *Railway Rates*, p. 53, by Mr. Grierson.
[2] Tooke, *History of Prices*, v. 376.

AGRICULTURE.

Agriculture in 1837.

For some years previous to the Queen's accession to the throne the prices of agricultural produce had been comparatively low, chiefly from a succession of seasons favourable to the wheat crop. The importation of foreign corn was then extremely small, and that of meat and dairy produce almost nothing. In the year following the Queen's accession the Royal Agricultural Society of England was founded, so that the whole life and progress of that society has been co-existent with her Majesty's reign. The question of Free-trade had not arisen. And, for seven years longer, the potato, the chief food reliance of the poorest of the agricultural class in Ireland and in the north-west of Europe, continued sound.

The Royal Agricultural Society.

The subjects which then seemed of chief interest to British agriculture are shown by the proceedings of the committee of the Royal Agricultural Society, soon after its formation in December 1838. Arrangements were made by them for annual agricultural shows of farm animals, implements of husbandry, and specimens of agricultural produce. Correspondence with similar societies at home and abroad was arranged. A veterinary school was projected. Prizes were offered for essays on agricultural subjects, and for experiments with manures. Reports were invited on the comparative advantages of different implements, on the management of water-meadows, on the best varieties of wheat for cultivation, on the keep of farm horses, on

stall feeding of cattle, on rotation of crops, on subsoil and trench ploughing, and on the best system of land drainage. The first volume of the journal of the society appeared in 1840, most of the contributors to which—Philip Pusey, the leading agricultural writer of his day, Earl Spencer, Sir James Graham, Henry Hindley, M.P., Sir Edward Stracey, J. E. Denison, M.P.—have passed away; the only two survivors now, both nonagenarians, being Lord Eversley, and Mr. John Dudgeon, the writer of the paper on Scotch agriculture.

Mr. Pusey then estimated the quantity and value of the English wheat crop at 13,500,000 quarters, worth, at 50*s.* a quarter, 31,000,000*l.* The average produce he put at 26 bushels an acre, and pointed out the gain which would be made by the addition to that average, of one bushel an acre. He further showed that an immense impulse not only to increased production, but to the demand for labour, would arise by the expenditure of an additional 1*l.*, profitably made, on each acre of the cultivated land of this country. The average rate of produce has since that time risen two bushels an acre; but, from fall of price, the money value of the 28 bushels, in 1886, was only 6*l.* 6*s.* an acre, while that of the 26 bushels in 1840 was 10*l.* 14*s.* 6*d.*

Among the subjects which then engaged the attention of landlords and farmers, the application of special manures to crops was beginning to attract notice. Foreign bones to the value of 254,000*l.* were imported in 1837. Nitrate of soda was experimentally tried in 1839. Peruvian guano soon afterwards was introduced. In 1843 I grew an excellent crop of potatoes with it, in the south-west of Scotland. The kind and mode of applying manure to each crop became the subject of scientific study and experiment. The Norfolk four-course system had shown signs of failure, by the difficulty of getting good crops of turnips or clover

when repeated every fourth year. In Flanders the skilful farmers, in view of this, had extended their rotations so that the same crop should not be repeated in less than ten, twelve, or fourteen years. Their more intensive system had led them earlier to notice this. Another question arose. Could no remedy be found for leaving the land idle during the nine months between the removal of the corn crop in August, and the sowing of the turnip crop in the following June? To fill up the vacant time, rye was sown in the more southerly counties, which was eaten in its green state on the ground in May by sheep, as a good preparation for the winter green crop sown in June. And vetches followed later, to carry on the stock to the aftermaths from the hay, the vetches to be eaten on the ground as a good preparation for later turnips.

Economy of labour by machines was confined to a general use of threshing machinery on all large farms. Turnip-cutters were recommended as a saving of one-fourth of the crop when consumed in the field, and were coming extensively into use. Cake and corn crushers soon followed. But there was then no thought of reaping-machines, or 'reapers and binders,' which are now becoming general.

In regard to live stock, the investigations of the Royal Agricultural Society showed that the cost of feeding farm-horses varied immensely, as much as 50 per cent. within a few miles, from want of knowledge, economy, and care. The earlier maturity of certain breeds of cattle and sheep, such as the Shorthorn cattle and Leicester sheep, which were fit for the butcher a year earlier than most other breeds, was urged upon the attention of farmers as enabling them to supply the market with the same quantity of meat at 30 per cent. less cost. It was felt desirable that an extensive plan of inquiry and experiment should be encouraged and entered upon as the foundation for establishing

some regular system. And to this object the labours of the Royal Agricultural Society of England, with those of the Bath and West of England Society, earlier established, and of local societies in most English counties, have since that time been unremittingly directed.

Scotland. In Scotland, the Highland and Agricultural Society had long been established. The circumstances of that country had compelled a more careful personal attention by the landowners to the advancement of agriculture than had yet been felt by the more wealthy landowners of England. The law had placed upon the Scotch landowners the direct liability of finding the money for the public establishments of their counties, the churches, prisons, and police. They had the determination of questions of road-making, and, having to contribute directly a large proportion of the county expenditure, they actively controlled its administration. This brought them into closer business contact with the farmers, and recent legislation has tended to increase this connection by the principle of imposing all county rates in certain proportion directly on landowners and farmers, and giving both a representation at the same county or parish board. There is thus a better fusion of the two interests than in England, and a readier appreciation on the part of the landowner of the outlays requisite on his part to enable the tenant to make the most of the land he farms.

Ireland. In Ireland, the relation between landlord and tenant is very different from that of England and Scotland. Many of the greater landowners are non-resident, and previous to the famine of 1846 the land was in a large measure in the hands of middlemen on leases for life, with leave to subdivide and sublet for the same time. These men had no permanent interest in the property; their business was to make an income out of it at the least cost, and their

intermediate position severed the otherwise natural connection between landlord and tenant. The potato famine in 1845–46 prostrated the class of middlemen, and brought the landlords and the real tenants face to face. But the level which the latter had been permitted to obtain, and the practice being that the tenant made the permanent improvements at his own cost, led them to consider the landowners very much as only the holder of the first charge on the land; and they were in the habit of buying and selling their farms among themselves, subject to this charge, a course which as a matter of practice was tacitly accepted by the landowner. He had security for his rent in the money paid by an incoming tenant, who for his own safety required the landowner's consent to the change of tenancy. This suited the convenience of landowners, the most of whom had no money to spend upon improvements, many of them non-resident and taking little interest in the country, and dealing with a numerous body of small tenants with whom they seldom came into personal contact. In the north of Ireland this custom of sale became legally recognised as *tenant-right*. The want of it in other parts of Ireland produced an agitation which ultimately led to the first Irish Land Act of 1870, and, ten years later, to the establishment of a Land Court with power to fix the rent. Circumstances have thus brought about a situation in which the landowner cannot deal with any freedom with his property either in the selection of tenants or in the readjustment of rents. And this has arisen, in a great measure, from the neglect by the landlord of his proper duties, in not himself executing those indispensable permanent improvements which the tenant was thus obliged to undertake, and who in this way established for himself a co-partnership in the soil itself.

The general progress of agriculture was suddenly in-

The potato famine.

terrupted by the appearance of the potato disease which, after a warning in 1845, spread over Western Europe with destructive force in 1846, suddenly laying waste the produce of vast tracts of country, and rendering desolate those poor and populous districts which had become dependent for their food on this hitherto prolific root. Ireland, especially the western and southern counties, where the poor population had little else to subsist upon but potatoes, was completely prostrated. In the worst unions in these counties twelve out of every thirteen people were wholly dependent on the potato for their food. In a single week, in July 1846, the promise of the potato crop was, by a mysterious blight, destroyed. A sudden fear fell upon Governments, both here and on the Continent, when they began to comprehend the true nature of the calamity. The late Sir Robert Peel, then Prime Minister, instantly made arrangements for the purchase in America of large supplies of Indian corn, to be immediately shipped for Ireland, the country in which, under Queen Victoria, there was the most pressing danger. Then followed the repeal of the corn laws, which saved us from the insurrections that rapidly spread on the Continent, changing dynasties and unsettling governments.

With the failure of the potato the agricultural system in Ireland collapsed. The people, no longer able to trust the root, ceased to 'conacre,' that is, to hire land from the neighbouring farmers as potato gardens; the farmer, deprived of conacre labour, had no money to pay wages in cash, and his land became unproductive; the landlord found his rent disappearing, while a new order of things grew out of the confusion.

To prevent the fearful consequences of famine, immense sums were advanced by Government for the employment of the people of Ireland in relief works. These were adminis-

tered by the grand juries, on the understanding that the money so advanced was to be expended in reproductive works, and to be repaid to the Government by instalments in a limited number of years. The pressure was so great that it was found impossible to control the expenditure in such a manner as to make it reproductive; and vast sums were squandered on works which could never be of any other value to the community than that of finding employment and wages for starving people for a time.

Effects of the famine.

The famine brought disease and crime in its train. Infirmaries, fever hospitals, dispensaries, and prisons were filled to overflowing. The expenses of these establishments were enormous, and raised the rates in many parts of the country to twenty shillings in the pound of the rental. As, by the law at that time, two-thirds of this increased rate fell upon the tenant, many farms were abandoned, cultivation was greatly diminished, and numerous labourers were unemployed. All the exertions of the Government were unable to cope with a disaster so sudden and so complete. Nearly a million people died, and such a check was given to the progress of Ireland that, by emigration and otherwise, more than a third of the population of 1845 has since disappeared. Whilst the increase of the population in Great Britain continued to maintain an annual advance of slightly over 1 per cent. since the census of 1841, the number of the people in Ireland has declined in the same period at fully the same rate. In the poorer parts of the country the people still cling to the potato for their food. There is no crop so uncertain, having varied in its produce, according to season, by as much as 50 per cent. four times in the last ten years, and to this extent, in the poorer districts, imperilling the people dependent upon it.

The potato famine, and the consequent free import of foreign corn and provisions into this country, mark an

important epoch in the Queen's reign. The gold discoveries in California and Australia happening about the same time, gave a rapid stimulus to enterprise and improvement in every branch of business, including that of agriculture. In 1850 and 1851 it was my duty, as commissioner for the *Times* newspaper, to undertake an inquiry into the state of agriculture in England in a time of great agricultural depression. On looking back on that time and comparing it with the present, there was great depression then, but more hope than at present. Wheat is now (1886) 17 per cent. lower in price than it has ever been for one hundred years.

1851. In July 1851, the Prince Consort, speaking at a banquet at the Mansion House on the opening of the first Great International Exhibition, pointed to the duty of every educated person closely to watch and study the time in which he lived in order to add his mite of individual exertion to further the accomplishment of the ordinances of Providence, the foremost of which he described as the realisation of the unity of mankind. The products of all quarters of the globe were placed at our disposal, and we had only to choose which was the best and cheapest for our purposes, while the powers of production and distribution were entrusted to the stimulus of competition and capital. The Exhibition of 1851 was to give a true test of the point of development at which mankind had arrived, and a new starting point from which to direct their further exertions.

The three preceding years had been eventful for British agriculture. Protection duties had ceased, and the landlords and farmers of this kingdom, no longer permitted to lean on an artificial support, had now to rely on their own energy and skill. In 1851 the new starting point had been reached, and with energy and vigour the task of increased production, to compensate for diminished

prices, was begun. It has since been accomplished not so much by surpassing the best farming practice of that time, as by a general advance throughout the country, leading up to that higher example.

The Exhibition year.

An unusual lustre was thrown on the meeting of the Royal Agricultural Society in 1851. Men from all quarters of the world flocked towards happy England to the International Exhibition, to see with their own eyes what it was in our institutions or our race that had raised this country, with its narrow boundaries, to the proud position which she held among the nations. The Royal Agricultural Show of this year was held on the playing-fields of Eton on the banks of the Thames, beneath the walls of Windsor Castle, the abode for many centuries of the sovereigns of England, over which floated the Royal Standard of the Queen. At no previous meeting of the society had there been so great a concourse of spectators, so fine a field for the exhibition, or such excellent specimens of all the best breeds of live stock in England. And never before could their peculiarities be studied with greater advantage. On the third day of the meeting the gathering of people, favoured by the beautiful weather, was immense. What a contrast did these British breeds present in the eyes of many of the foreign visitors to those to which they were accustomed at home! The sleek and contented Shorthorn, the more sprightly faced Hereford, the handsome Devon, had a placidity and easy, well-fed satisfaction about them, which spoke of the green fields of England, and must have puzzled a Hungarian magnate, accustomed to his vast droves of white lean cattle, roaming for miles over the sometime parched plains of the Teiss, in search of their scanty pasture. Not less astonished was the German flockmaster, familiar with his fine-woolled but scraggy-looking sheep, when he saw the matchless symmetry of the Southdowns.

From the new starting point in 1851, when the best farming was exceptional, there has been little advance from the best practice then reached. Drainage was well understood and was rapidly extending. The use of purchased manures and linseed cake, in addition to the manure of the farm and its green produce, was spreading slowly in the better-farmed districts. Bone manure had a well-established reputation, especially in dairy counties. Peruvian guano and nitrate of soda, wherever tried, were found a most useful mode of promoting growth and increasing the bulk of the crop.

And the literature of agriculture was not found wanting. Foremost of all were the most readable and practical essays of Philip Pusey, in nearly every number of the journal of the Royal Agricultural Society, the embodiment of that society's motto, 'Practice with Science.' From week to week, up to the present time, the pages of the *Agricultural Gazette*, edited from its commencement forty years ago by John Chalmers Morton, have poured forth from the experience of practical farmers a continuous flood of knowledge and light upon every subject connected with agriculture. The famous experiments of Sir John B. Lawes at Rothamstead, as described by him and his scientific assistant, Dr. Gilbert, in the pages of the Royal Agricultural Society's Journal, from year to year, have formed a guide to improved practice in this country, both with crops and in the feeding of live stock.

The train was thus laid for a rapid extension of the best practice in all parts of the country, when the strong motive-power of personal interest should come into play. In 1850 and 1851 the price of wheat was 39*s.* 4*d.* a quarter; and of salt beef and pork, 36*s.* a cwt. From that time prices began to rise and continued to do so, with slight exceptions, to 1874. The price of wheat, meat, and dairy

produce, many times between these dates, reached an increase of 50 to 60, and in more than one instance 100 per cent., above that of 1851. The price and rent of land rapidly increased in the same period, and a great stimulus was given to land improvement, and to the extension of the best agricultural practice. Earlier maturity in perfecting cattle and sheep for the market, by good feeding from their birth, added probably a fourth to the weight of home-grown meat during the period of good prices. Landlords and farmers shared in the general prosperity, and the wages of labour and the bills of tradesmen increased in like fashion.

Landlord and tenant.

There are two capitals employed in British agriculture, that of the landowner and that of the farmer. The first, which is the land itself, and the permanent improvements upon it, has hitherto been certain and safe, and therefore yielding a small return; the other, the live stock and crop subject to risk of seasons, and speculative, and liable to competition prices, requiring a much larger percentage to cover risk. The capitalist is content with 3 per cent. for his heretofore secure investment, which carried with it also influence and social position. A farm worth 50*l.* an acre for the freehold, needs a further 10*l.* an acre to provide the farmer's capital for its cultivation. The landowner is satisfied with a return of 3 per cent. on his 50*l.*, while the tenant looks for 10 per cent., for management and risk and capital, on his 10*l.* Let us suppose that the farmer has a capital sufficient to buy 100 acres at this price, and stock them; he would get for his 5,000*l.* invested in freehold 150*l.*, and for his 1,000*l.* farm capital 100*l.*, together 250*l.* But if he followed the custom of this country and used the whole of his capital in cultivating another man's land, he would with his 6,000*l.* hire 600 acres, on which his return ought to be 600*l.* He in truth then trades on the capital of the landowner, practically lent

to him at the moderate rate of 3 per cent., which he converts into a trade profit on his own capital of 10.

The British landlord is thus the nominal owner of five-sixths of the joint capital embarked in agriculture, and upon him in the end the chief weight of any disaster must fall. But while his ownership is hampered by entail and settlement he cannot use his position with the freedom of absolute ownership, and is thus disabled from bearing his share of the strain that is now pressing on the land. The settled Land Act of the late Lord Cairns has been a partial relief. But it is only by fee-simple ownership that a landowner in difficult times, such as the present, can do justice to his estate and his tenants.

In regard to tenants, recent legislation in England and Scotland might have proved highly beneficial if its effect had not been practically limited to the 'quitting' tenants, and thus to that portion of them, not one-tenth in number, who may be described as the old, or the least prosperous and persevering of their class.

The hopes excited by the expressed intention of the Prime Minister, Mr. Gladstone, in 1881, to deal with the devolution of land, the transfer of land, the registry of land, and the mode of borrowing on land, all disappeared under the pressure of the Irish land question. It has been assumed by an influential class of politicians that the agricultural system in that country can be rendered sound and prosperous by the conversion of the landlord and tenant system into that of cultivating ownership. And the main part of the time of the Legislature, so far as the land is concerned, has since been engaged towards that object, to the exclusion of those questions which so pressingly affect the welfare of the agricultural interests of Great Britain.

It would, however, be a great error in regard to British agriculture, whatever may be the final decision in regard to

Ireland, to take any legislative step which should tend further to alter the well-recognised rule that the landlord makes all the permanent outlays required, and the tenant finds only the capital for cultivation. And it would be an equally mistaken policy to take any course which should diminish the landowner's interest in the continued improvement of his property. The landowner in this country has two capitals in the land: the soil and all that is beneath it, and the buildings and other permanent works made by his capital upon it, and required for the accommodation of the people and the stock and crop of the farmer. On good agricultural land, worth 50*l.* an acre, the land will represent 35*l.* of that value, and the buildings and other permanent works 15*l.* It is seldom that the farmer can command more capital than is needed for that fuller cultivation which our exposure to foreign competition demands. It is therefore most important that such measures should be devised as will best tend to the continuous increase of production, by giving a distinct but united interest to both landlord and tenant in obtaining that result. The experiment being tried in Ireland of Government advances to tenants for the purchase of their farms might, however, with great advantage be offered to the larger farmers of Great Britain. This might be done with the view of increasing the proportion of occupying landowners, and might be limited to those occupiers who were prepared to pay down one-fourth of the price.

Ireland and Canada.

In regard to the agricultural condition of Ireland, if there was no other objection than the inevitable increase of poverty, to the principle of converting the poorer part of the country into a land of small peasant proprietors, that would be a sufficient objection. For it is wrong to offer inducements to poor people to stay on poor land when, within the same dominion, there are immense regions of

rich land waiting to be occupied. This island is the nursery of nations, and great territories west and east have been committed to our charge, upon which we may plant the English-speaking race. The emigrant from Ireland can in a fortnight's time be in the Canadian North-West, where millions of acres of good land are at present open to free settlement. The climate, though very cold for one-third of the year, is as healthy as that of the neighbouring prosperous American States of Minnesota and Dakota. The country is traversed by the Canadian Pacific Railway, with branches spreading out on either side as access is required by the new settlers. Every crop that is produced here thrives there, and fruit and vegetables grow to great perfection. Here is an agricultural country belonging to the British people, within easy reach, ten times the extent of Ireland, with railway access and navigable rivers, with coal and other valuable minerals, and yet a considerable party in the Imperial legislature is Labouring to discover plans for retaining in the west of Ireland a population which in small tenancies of poor land are holding their farms not for profit but for existence, and who in most years are in a state verging upon starvation.

Bad seasons.

After 1874, agricultural prosperity began to wane through an unprecedented series of bad seasons. In eight years, ending in 1882, there were only two good crops, and among the bad was the crop of 1879, the worst of this century. During this period much agricultural capital was lost. And there was no compensation by higher price, for the loss of crops in Western Europe stimulated in an extraordinary degree the extension of wheat-growing in the United States of America. They had productive years when the crops were deficient here. In a single year they increased their wheat acreage by an extent equal to our total growth. In the twenty years from 1860 to 1880 their production

American competition.

of wheat rose from twenty to sixty million quarters. They could not have found an outlet for it but for the most rapid increase of railroad communication with which it was accompanied, and the increased demand from Western Europe. The cost of transport fell from twopence per ton per mile to a farthing. The distance from which wheat could be conveyed was thus increased eightfold. And as a ton of meat or provisions is six times the value of a ton of corn, and as these are yielded by the land in about that proportion, the produce of six acres in the form of meat or provisions can be transported as cheaply, so far as weight is concerned, as that of one acre of corn. This formidable and growing competition in both corn and provisions we must now reckon with.

The long-continued period of bad crops and low prices, added to the losses of live stock, especially sheep, in the wet cold seasons by disease, had reduced the capital of the farmers in this country by 30 to 50 per cent. when the collapse of prices, beginning in 1875, fell upon them. Their gradual but growing poverty had for several years forced them to discontinue outlays in the maintenance of the condition of their farms. The poor clay lands are going out of cultivation. In the corn counties much of the land is in this position, and considerable tracts being without tenants are farmed by the landowners. Large reductions of rent have been made, and where land has from any cause been pressed for sale, the price has fallen greatly. At no period of the Queen's reign has there been such depression in the interests of agriculture as now exists in the year of her Majesty's Jubilee.

Cheap food.

On the other hand, never has there been a time in which every article of food has been so plentiful and cheap. In the earlier years of the Queen's reign the home and foreign supply of wheat was in the proportion of two-thirds home-

grown, and one-third foreign. In 1851 the whole supply afforded 317 lbs. per annum to each of a population of 27,000,000, which at the average price of the previous ten years of protective duties amounted to 53,500,000*l.* But the total supply of 1885 gave 400 lbs. per head to a population of 36,000,000, at a cost of 43,700,000*l.* Not only were our people, 8,500,000 increased in number, fed with bread at a diminished cost of 10,000,000*l.* sterling, but each individual had an additional supply of one-fourth beyond that of 1851.

The supply of animal food in 1885, as compared with 1851, increased in still larger proportion. The quantity to each individual of the increased population was 115 lbs. per head for the year 1885, as compared with 90 lbs. per head in 1851. This is an increase of nearly one-third to the supply of each person, the main part of which increase has come from foreign countries. A result so beneficial in the supply of bread and meat, to our ever-increasing population, must render any return to protective duties on food in this kingdom impossible so long as that increase is maintained by the other successful industries of the country.

These increased supplies are coming yearly in larger proportions from the great colonies and possessions under the dominion of the Queen. The supply of wool from Australia and other British possessions comprises nearly four-fifths of the 650 million pounds grown in this country and imported annually, nearly one-half of which is again exported to the Continent. Of the foreign supply of meat the United States still furnishes much the largest proportion. But, by the refrigeratory process now successfully introduced, more than a million carcases of sheep are already yearly brought to us from New Zealand, and laid down in excellent condition in London, at a cost for killing,

packing, cooling, and freight of 2½*d.* a pound, which on mutton of such good quality leaves, from the price here, a reasonable profit in the difference of the value of the carcase there, and here, to the importer. And as there is a marked decline in the sheep stocks of Western Europe, and no probability of much increase in North America owing to the costly keep indoors during the severity of the winter climate, it is satisfactory to the British consumer that he has the prospect of increasing supplies of good mutton from his brethren in Australia and New Zealand.

Sir J. B. Lawes.

The agricultural experiments of Sir John Bennet Lawes, which have been continued for more than forty years of the Queen's reign, have clothed 'Practice' with 'Science,' in many points on which the British farmer was groping for knowledge. These experiments have been made on land on his estate of Rothamsted in Hertfordshire, very accessible to the agricultural inquirer. The results have been published annually, and the farm itself, with every detail of the work both in the field and the laboratory, has been laid open to public inspection and criticism. Wheat, barley, and oats have been grown under a variety of manures, plots with no manure being in every case reserved for comparison. Root crops, including potatoes, have been added. And in 1856 an important series of experiments was commenced on grass land, which, with very little change on each of the twenty plots, has been continued to the present time. The experience of the past thirty years shows that the natural produce of grass may be doubled, and even trebled, by the continuous use of special manures. As two-thirds of the cultivated land in this country, and all the permanent pastures, are in grass, this series of experiments is of very great interest and value.

'It is quite certain,' says Sir John Lawes, 'that arable soils are poorer than the pastures from which they are

frequently derived, and that their fertility must be restored to them before a fresh pasture can be said to be re-established. It is the cost of this operation that has given rise to the saying that "laying land down to pasture breaks a man." The question is whether some of the cost incurred cannot be saved. There is plenty of foul land in the country upon which the experiment might be made. And I should be disposed to advise those who have the misfortune to own such land, at all events to try whether the superior grasses, when aided by manure, will not be competent gradually to drive the weeds out of the soil.'

In the wheat experiments it is not surprising to find, after forty successive crops, that the soil begins to exhibit signs of exhaustion. This has been corrected by interposing a heavily dunged green crop, while the introduction of red clover, at long intervals, between the corn crops is also found to add greatly to the corn-producing power of the soil. To attain a maximum-paying produce he finds that the land should be dunged heavily for mangold to be followed with wheat, or barley, or oats, for several years in succession; then interpose clover, and follow it with corn crops, keeping the land perfectly clean, and manuring all the corn crops with nitrate of soda and superphosphate. When the land shows need of change, begin again with heavily-dunged green crops. Successive crops of barley he finds to pay better, and they are more certain in his climate, Hertfordshire, than either wheat or oats, and give more corn in proportion to straw. If a heavily dunged green crop is introduced, it is not necessary for a further succession of years to give any other manure to the corn crops than nitrate of soda and superphosphate. Potash (which may be supplied by dung) is very necessary in a grass manure, especially for clover, which, unlike corn, is injured by ammonia. The grass experiments show that, by giving

food to the plants, the strongest and best varieties appropriate what they most need, and by the law of the strongest put the weaker down. In the best plots the weeds almost disappear, while on one plot to which no manure is applied the weeds form 50 per cent. of the produce.

In the same direction the Royal Agricultural Society of England, some years ago, commenced a series of experiments on the growth of crops, and the fattening of live stock, with a special relation to the manures applied and the food used, and to the effect of the manures resulting from specific kinds of food. The Duke of Bedford with great liberality and public spirit has placed suitable land and buildings at the disposal of the society, whose council, under the guidance of their very able secretary, Mr. Jenkins, lately deceased, and their consulting chemist, and their botanist, regulate and superintend the experiments. The whole is open to public inspection, and the results are carefully elaborated and published in the Journal of the Society.

Improved seeds and stocks.

A most useful class of agricultural improvements has been the introduction, during the Queen's reign, of improvements in the seed of the various kinds of corn and vegetables, as well as the earlier maturity and improved character of the live stock. By careful selection, and more recently by hybridisation, improved varieties of wheat, barley, and oats have been introduced with much success, and the same with potatoes, mangold, and other vegetable crops. The improvement in sheep and cattle is even more conspicuous. Probably one-fourth in weight of meat brought to market has been added in these fifty years by the earlier maturity of our live stock. What was exceptional then has now become general. The quality of seeds of all kinds, and of sheep, cattle, and horses, in all parts of the country, has greatly and generally improved.

In regard to farm implements the most certain gain has

Farm implements.

been in the introduction of the reaping and mowing machine. This machine, originally the invention of a Scotch clergyman, was for many years neglected in this country, but was improved in 1834, and perfected by Mr. McCormick in the United States, where the crops of vast plains of wheat could not otherwise have been handled from want of labour. In 1848, 700 of the McCormick reapers were sold in America, and the annual sale had grown to 50,000 in 1884. Again introduced into this country in recent years, when difficulties arose between employers and labourers, the use of the reaping machine rapidly spread, and it is constructed in this country to meet the requirements of much heavier crops than those in America. The farmer now reaps and gathers his corn at a great saving of cost, and in the knowledge that at the most critical season he is able to secure his crops with little outside help. Sheaf-binders attached to the machine are successfully coming into use.

The steam cultivator, first invented by the late John Fowler, of Leeds, and much improved by his successors in the business, has been largely employed, but as yet more as an auxiliary than in superseding the ordinary working stock of the farm. It is invaluable in enabling the farmer to overtake the preparation of his land for crops during favourable weather; and where deep ploughing is required to bring up fresh and to bury exhausted soil, no implement can effect the object so cheaply and expeditiously. But it is a costly implement, and, except on large farms of heavy land, it is more prudent for the ordinary farmer to hire when he requires it, than to purchase.

The variety of implements and machines now used in English agriculture will be understood from the fact that the number of such articles exhibited at a recent annual show of the Royal Agricultural Society exceeded 6,000. Many of

these were in use in the early years of the Queen's reign, but additions and improvements are every year being made to them.

Within recent years the system of storing in pits or stacks, termed silos, green grass or fodder of any kind, has been successfully introduced. In wet seasons for hay-making this practice is found very convenient, and, though the nutritive quality of the grass is not increased, it may be safely preserved in this way in such seasons. Coarse grass which could not otherwise be utilised can by this process be turned to good account. It is claimed as especially useful on dairy farms, as winter provender for cows in milk, where green food cannot otherwise be profitably grown. Ensilage.

The future of the landed interests, and of the public in regard to the supply of food, may be briefly considered. There are already signs of returning activity in trade, and with a population increasing at the rate of nearly a thousand a day, there must be a growing increase in the consumption of bread and meat. Bread was never more plentiful and cheap, and any return to the prices that ruled twenty years ago can neither be expected nor hoped for, seeing the vast change and economy in the cost of transport, and the ever-widening fields of colonial and foreign production. In ten years the growth of wheat in this country has declined thirty per cent. Other kinds of corn remain much as before. Barley meets with severe competition from Indian corn, which, in its various uses, prevents any considerable rise of price in barley. Oats, which are still largely grown in Scotland and Ireland, seem likely to maintain their place. The dairy and market-garden system, fresh milk and butter, veal and lamb, beef and mutton of the finest quality and early maturity, vegetables, and hay and straw, are every year enlarging their circle around the seats of The future.

increasing populations. These are the articles which can least bear distant transport, and are therefore likely longest to withstand the influence of foreign competition. The refusal to admit live cattle or sheep from any foreign country where cattle disease is known to exist, has proved of the utmost value as a sanitary precaution. As the result of lower prices, the poor clay soils, which are expensive to cultivate and meagre in yield, will be gradually all laid to grass, or be planted, and the poorer soils of every kind, upon which the costs of cultivation bear a high proportion to the produce, will follow the same rule of necessity. During the last twelve years the permanent pasture in this country has from this cause been increased by more than two million acres, upwards of ten per cent.

The consumption of food in this country has increased not only in proportion to the increase in the numbers of the people, but also with the hitherto augmenting scale of wages. Fifty years ago the agricultural labourers rarely could afford to eat animal food more than once a week. Of late years some have had it every day, and, as the condition of the rest of the people has improved in a greater degree, the increased consumption of food in this country has been prodigious. In addition to the whole of our home produce, we are importing in this Jubilee year probably 140,000,000*l.* worth of foreign food. If this goes on at the same progressive rate for the next twenty years, we may look forward with confidence to adequate supplies, at moderate prices, from the fertile soils of the Queen's colonial possessions in Australia, India, and North America, besides what may come from foreign countries.

British agriculture is now undergoing the most severe trial to which it has yet been exposed. In 1851, when concluding the inquiry made by me in that and the previous years into the state of agriculture in the English counties,

I referred to education in its widest sense as the most powerful aid in its further progress. Knowledge—of their business and true interest by the landlord and the tenant, and of the best mode of promoting his own welfare by the labourer—was then the first requisite towards an improvement of their condition. The tide of prosperity had begun by the recent gold discoveries of California and Australia, and it continued to flow for the next twenty-five years. During that period, from the greater prosperity of the people and the increased consumption of agricultural produce, the capital value of the land and of the live stock and crops upon it were increased by four hundred and forty-five millions sterling. The measures of a public character, required in addition to those within the power of individual landlords and farmers, have to a considerable extent been accorded by the Legislature. The Settled Land Act, and the Agricultural Holdings Acts in Great Britain, with the Land Acts in Ireland, mark a great advance in land legislation. But one of the most important, that of cheapening and facilitating the transfer of land, has still to be undertaken.

Much of the increase of capital value of the land, up to 1874–76, has since that time been lost, first by a series of bad years unprecedented in their continuance, causing not only diminished crops, but also heavy loss in the live stock through the wet and unhealthy character of the seasons. The subsequent collapse of prices, which took place in 1885, falling as it did upon an agricultural class already impoverished, has completely disheartened both landlords and tenants, and has seriously crippled their power to give employment to their labourers. Its effects are at the same time felt among the tradesmen in the country villages and towns, whose business is dependent on the spending power of the country squires and farmers. It is a remarkable

fact, illustrative of the change of the agricultural system, naturally brought about under the influence of foreign competition, that the home production and value of wheat in England and Wales at the end of fifty years of the reign of Queen Victoria, which, at the commencement, was estimated by Mr. Pusey at 13,500,000 quarters, worth 31,000,000*l.*, will not in 1886 exceed one-half of that quantity, and be worth not much more than one-third of it in value. This clearly explains the great fall in the rent of the wheat lands in this country, especially those of the heavier class in the counties on its eastern side.

Transformation of British agriculture.

These islands are becoming every ten years less agricultural and more pastoral. In the last twenty years three million acres, nearly one-seventh of land under rotation, have been added to the permanent pasture. This change is likely to go on, as only the better class of lands can compete successfully with the products of rich and unexhausted soils now brought so cheaply to our shores. We have still an advantage over these in the cost of transport, which is equal to the rent here. And to that extent British agriculture on the good land should be able to hold its own. But the poor clay soils, which are expensive to cultivate and small in yield, and the poorer soils of every kind, will be gradually laid to grass, or be planted for timber. The climate is admirably adapted for grazing. If our manufactures and mines continue to maintain a successful competition with other countries, and if our population, increasing at the rate of one thousand a day, besides sending largely to our colonies, can find adequate employment at home, there will still be a remunerative market for that description of agricultural produce which can least bear the risk, and cost, of carriage from distant countries.

JAMES CAIRD.

THE COTTON TRADE AND INDUSTRY.

Retrospect.

BEFORE commencing my brief account of the chief events that have characterised the history of this important industry during the past fifty years, it may be well shortly to refer to its position at the end of the last century, in order the better to provide an estimate of the great changes that have taken place within comparatively recent times.

About the close of the year 1800 the cotton industry, among all the larger industries of the country, was probably the most backward. It had been started under circumstances of great difficulty. The raw material had to be imported from very distant countries, and that, too, at a time when steam-power was unknown and the means of transit were slow, costly, and precarious. The people of India then possessed such aptitude and skill in the arts of spinning and weaving that their own cotton productions seemed almost to defy foreign competition.

It is not necessary to refer in any detail to the discoveries and inventions of Hargreaves, Arkwright, Crompton, Kay, Cartwright, and Peel, men whose names are imperishably entwined with the annals of British industry, and especially with that of Lancashire. These early inventors may, however, be fairly described as the great pioneers of the cotton manufacture, and mainly to their genius is due its capability for future development.

In the inventions of Watt and the application of steam to the various processes of cotton manufacture will, of course, be found the primary causes of the remarkable and rapid progress of the cotton industry. Let us glance at its earlier condition, and the status of its workers before they came under the all-changing influence of steam as a motive power. In its early institution, and for many generations afterwards, the cotton manufacture, like many another infant industry, was conducted on a semi-domestic basis; that is to say, the workshops were situated in or adjoining the dwellings of the workers, and frequently the father or head of the family group acted as superintendent and manager of the little manufactory, which seldom comprised more than three or four looms. In one respect at least the operatives of this time seem to have been specially favoured, for many enjoyed the much-coveted allotment of land attached to their cottages. The hard-and-fast rules of the factory system, as to hours of labour and other matters, had of course no part in ordering the lives and labour of these early and, on the whole, well-circumstanced workers. Their condition, indeed, must have been one of comfort and independence compared with that which awaited them and their successors.

One can well imagine what a complete change the introduction and consolidation of the factory system effected in the circumstances of these people. The transition from the quiet seclusion of the hamlet to the bustling town, from the family workroom with its paternal head to the large factory overlooked by exacting taskmasters, and resounding with the rattle and whirl of machinery, formed a strange contrast, and, as a rule, the cotton operative in the early days of the factory system keenly felt his altered lot. Nor is this surprising. Ill-fed, ill-clothed, ill-lodged, ill-cared for, without any educational advantages or intellectual pursuits,

his unremitting toil pursued without a ray of hope, the best that could be said of his life was that it was short. Indeed, such were the evils incident to the introduction of the new order of things, coupled with the *laissez-faire* attitude then assumed by the State, that they might have caused even Jefferson himself to have questioned the soundness of his own dictum, that that State was governed best which was governed least. Allowance must of course be made for the complete changes brought about by the transition from the old to the new methods of manufacture. Experience alone could effect many of the social and sanitary reforms that were necessary for the preservation of health, order, and cleanliness in the workrooms and shops of the factories. But still, after taking every circumstance into consideration, it must be admitted that the early cotton-lords were animated in their dealings with their workpeople, in far too many cases, mainly by motives of self-interest. They regarded them too often as hewers of wood and drawers of water—as so many human beings born into the world for labour, and little else. But at length the evils of the situation became so marked as to call for legislative interference, and the result was the passing of various Factory Acts, commencing with the year 1825 or thereabouts, which had for their objects the regulation of the hours of labour and restrictions on the employment of children and young persons.

The introduction of these humane and sensible regulations must ever be associated with the name of Robert Owen, one of the most remarkable men of the present century. At the age of eighteen he became a partner in a small cotton-mill. Fortune favoured him, and he prospered in one lucrative concern after another, till he became the head of the New Lanark establishment, which included a farm of 150 acres and supported 2,000 inhabitants. The

mills at New Lanark were started in 1784, when Owen was a boy, by Arkwright, in conjunction with the benevolent David Dale, of Glasgow, whose daughter became Robert Owen's wife. Owen was a consummate man of business, and, had wealth been his ruling passion, he might have left behind him a princely fortune. But his chief solicitude was for the factory toilers. The library, schoolroom, and other provisions which he made for the comfort and elevation of his operatives were then almost unknown advantages among the working classes. He believed that labour, to be effective, must be based upon health and contentment, and to his suggestions are due the main features of our present system of factory and workshop legislation. To his name must be added those of Lord Shaftesbury, John Fielden, and Richard Oastler, the 'factory king'—men who thought and laboured for the white slave of Lancashire, as Wilberforce, Macaulay, and Clarkson did for the negro.

The condition of the cotton trade at the accession of Victoria.

The following quotations, showing the condition of the cotton trade at the commencement of the present reign, may not be without interest. They will, I think, support the conclusion that, within the period treated of, greater changes have taken place in the social and economic condition of the people than have occurred within any previous period.

At the accession of her Majesty Queen Victoria, the staple trade of Lancashire was in anything but a prosperous condition; in fact it seems to have been suffering from one of those occasional seasons of depression which checker the fortunes of all great industries. It is not my duty to trace in any detail the fiscal and other causes which must be held accountable for the terrible state of affairs with which our record opens. Professor Levi, in his interesting work on the history of British commerce, thus refers to it: 'Great

gloom then gathered over our commerce. A panic set in in earnest, and bankruptcies, cessation of business, depreciation of goods and securities, prostration of trade, followed each other with wonderful rapidity. At Manchester there were 50,000 hands out of employment, and most of those employed were working only half-time.' I may add the well-known and independent testimony of M. Guizot as to the condition of the manufacturing centres of Lancashire at that time. Writing of the period 1836–40, he says: 'Bolton, a town of the second class, near Manchester, containing about 50,000 people, had been thrown by the commercial crisis into a condition of utter misery. Out of fifty manufactories, thirty were closed; more than 5,000 operatives knew not where to seek or obtain the means of subsistence. Disorder and crime, as well as misery, increased with awful rapidity; nearly half the houses were tenantless, the prisons overflowed, infants died in their mothers' arms, fathers deserted their wives and families, striving to forget those they could no longer maintain.' But brighter days were at hand, and, aided by wiser fiscal laws and freer institutions, not only the cotton trade, but the general commerce of the country, was destined to experience a progress and development of which the following figures, showing in a compact form some of the chief movements in our trade during the last fifty years, will afford some idea:

Imports.[1]

Year	Total value	Proportion per head of population of United Kingdom
	£	£ s. d.
1856	174,544,154	6 3 2
1860	210,530,873	7 7 0
1870	303,296,082	9 16 9
1880	411,229,565	11 17 7
1885	370,967,955	10 4 3

[1] The real value of imports was not ascertained till 1854.

Exports.

Year	Total value	Proportion per head of population of United Kingdom
	£	£ s. d.
1840	51,308,740	1 18 9
1850	71,367,885	2 11 10
1860	135,891,227	4 14 7
1870	199,640,983	6 9 6
1880	233,060,446	6 8 10
1885	213,044,500	5 17 3

Since the commencement of the present reign the exports have been more than quadrupled, and within the last thirty years the imports have been more than doubled.

Growth of the cotton trade during the last fifty years.

It may fairly be said that Great Britain has held her own with other nations of the world in the cotton industry, notwithstanding the so-called protective tariffs imposed by so many countries, and which, it should be remembered, necessarily impede and limit the volume of business. The following figures show the imports of raw cotton during the last five decades:

Raw Cotton imported.

	lbs.
1840	592,000,000
1850	685,000,000
1860	1,390,938,752
1870	1,338,305,584
1880	1,628,664,576
1885	1,425,816,336

It has been estimated that at the present day, within an area of thirty miles round Manchester, the population exceeds that of the like area round St. Paul's. A vast proportion of this mass of humanity is either in immediate connection with the manufacture of cotton, or ministering in one way or another to its requirements—either by bleaching, dyeing, printing, machine-making, or otherwise preparing the article for manufacture and sale, or distributing it for consumption. The following figures give the

census returns during the last fifty years for the county of Lancashire:

1831	1,336,854
1841	1,667,054
1851	2,031,236
1861	2,429,440
1871	2,819,495
1881	3,454,225

Before the inventions of Hargreaves, Arkwright, and Crompton, the county of Lancaster was but sparsely inhabited. The united population of Manchester and Salford at the commencement of the century was, in round numbers, about 87,000. At the present time the population of Manchester with Salford is about 570,000, whilst, as we have seen, that of the county was given at 3,454,225 at the last census. As the increase has been most marked in the centres connected with the cotton industry, it seems clear that to the influence of that industry this enormous augmentation is attributable.

A few figures may here be useful as demonstrating the extension of the cotton trade during the last half-century.

In 1837 there were about 18,000,000 spindles.
„ 1886 „ „ „ 43,000,000 „
„ 1837 „ „ „ 100,000 looms.
„ 1886 „ „ „ 600,000 „

In 1837 the consumption of cotton was about 400,000,000 lbs.
„ 1886 „ „ „ 1,451,200,000 „

Number of Persons employed in Cotton Factories.

Years	Males			Females			Total Persons
	Under 13 years of age	Of and above 13 years of age	Total Males	Under 13 years of age	Of and above 13 years of age	Total Females	
1870	23,142	155,255	178,397	20,139	251,551	271,691	450,087
1874	33,672	153,948	187,620	33,228	258,667	291,895	479,515
1878	28,663	156,809	185,472	33,260	264,171	297,431	482,903
1885	23,904	172,474	196,378	26,088	281,603	307,691	504,069

The Cotton Famine.

A sketch of the cotton industry during the last fifty years would not be complete without some account of the great Cotton Famine which resulted from the American Civil War. At that time the spinners relied far too much upon the planters of the Southern States of America for their supply of the raw material. The institution of slavery, being one of those devils which would not come out of a nation without rending it, had in the opinion of many rendered a civil war at some time or other almost inevitable. It was easy to predict that such a war, when it did come, would prove disastrous to the staple industry of Lancashire. With the view of averting such a calamity, efforts had been made to encourage the growth of cotton in countries other than the Southern States of America. As far back as the year 1850 a meeting of the Manchester Chamber of Commerce was held for the 'purpose of considering whether any course was open whereby an enlarged commercial intercourse with India could be promoted and an increased supply of cotton obtained.' Nothing, however, was effected. The danger was not imminent, and apathy once more reigned supreme. A few years later, in the year 1857, the uneasiness consequent upon our obvious dependence upon one source of supply again reasserted itself, and the result was the establishment of the Cotton Supply Association, the object of which was to promote the growth of cotton in India and other countries. But when the note of war sounded in the great Republic, Lancashire was still in complete dependence on the Confederate States for its supply of cotton. The dreaded evil had become a stern reality. To appreciate the force of the calamity which now fell upon Lancashire and the surrounding districts, let us look at the imports from *all* the cotton countries for 1860, the year *previous* to the declaration of war.

	lbs.
The United States	1,115,890,608
Bahamas and Bermudas	585,984
British West India Islands	464,800
New Grenada and Venezuela	225,120
Brazil	17,286,864
The Mediterranean	82,544
Egypt	43,954,064
East Indies	204,141,168
China	3,920
Other countries	8,303,680

It will thus be seen that of the total amount imported, viz. 1,390,938,752 lbs., no less than 1,115,890,608 lbs. came from America.

In June 1861 the cotton trade was in a surfeited condition. Mr. Arthur Arnold, in his 'History of the Cotton Famine,' says: 'At the time of the battle of Bull's Run there was more cotton in England than at any other period of the trade. . . . The exports of yarn and goods for the first nine months of the year 1861 amounted to 537,969,000 lbs., less only by 16,250,000 lbs. than the exports for the same period of the previous year. But the total production of yarns and goods from January to September 1861 was 779,279,000 lbs., of which, therefore, 241,801,000 lbs. were retained at home. The average home consumption for this period would be 135,000,000 lbs., so that in the first nine months of 1861 at least 100,000,000 lbs. of yarn and goods *were added to the large stocks then remaining in the country*.'

In October of this year, the first signs of distress and disaster appeared, mills and factories beginning to work half-time. Middling Orleans now rose twopence per pound, and before the year closed, that staple was selling at about a shilling a pound. Lancashire's difficulty became India's opportunity, and the hitherto neglected Surat cotton rose in this month from sevenpence farthing to tenpence per pound. A general conviction now spread among the community that, though the crisis might be severe, it would

not be of long duration. The cotton-masters of Blackburn were the first to propose a public meeting to consider the prevalent distress, and their example was followed by several large towns. The grey dawn of the new year of 1862 opened upon a scene of much misery and privation. Some idea of the poverty and distress then prevailing in the chief cotton manufacturing towns may be afforded by the figures showing the imports of cotton for the year after the declaration of war and during the remainder of the famine.

Quantities of Raw Cotton imported into the United Kingdom from the United States, India, and Egypt—which are the three Principal Countries from which the Raw Cotton was imported during the Cotton Famine.

Years	The United States	Egypt	East Indies
	lbs.	lbs.	lbs.
1862	13,524,224	59,012,464	392,654,528
1863	6,394,080	93,552,368	434,420,784
1864	14,148,064	125,493,648	506,527,394
1865	135,832,480	176,838,144	445,947,600

Average Prices for the same Period.

Years	The United States	Egypt	East Indies
	Per cwt.	Per cwt.	Per cwt.
	£ s. d.	£ s. d.	£ s. d.
1862	10 2 4	7 1 4	6 5 9
1863	11 5 8	10 11 8	8 18 11
1864	13 11 10	12 15 3	8 9 0
1865	9 18 6	8 16 1	6 5 7

It will be observed that American cotton, the average price of which for the year 1860 was 3*l.* 0*s.* 4*d.* per cwt. and for the year 1861 3*l.* 12*s.* 5*d.* per cwt., had trebled in value. During the summer of this year, East Indian cotton began to come more prominently into demand. The average price for this year was no less than 6*l.* 5*s.* 9*d.* per cwt.; whereas for the year 1850 it did not command a greater average value than 1*l.* 17*s.* per cwt. Nothing but dire necessity could make the Indian cotton acceptable to the large majority of spinners, that description of cotton being

of an inferior quality, short in staple, and harsh and brittle in fibre. It was, further, altogether unadapted to machinery which had been designed to deal exclusively with the fine qualities and long staples of American and Egyptian growth. Great damage was inflicted on the fine and delicate appliances used in spinning and weaving the softer sorts of cotton; but eventually the situation had to be faced, and vast sums were expended in adapting the machinery to the new order of things. So great were the changes needed in this respect, that the alterations effected by spinners and manufacturers, in nearly every department of their works, amounted almost to the creation of a new industry.

The month of May 1862 saw the establishment of two great charitable agencies, viz. the Central Relief Committee of Manchester and the Mansion House Committee of London—public bodies which, in spite of some mistakes, unquestionably earned the gratitude of the public for the manner in which they discharged their self-allotted duties.

The originator of the Mansion House Committee was Mr. William Cotton, who first brought the subject to the notice of Lord Mayor *Cubitt*. On May 16 that dignitary was able to announce that a fund had been established under the name of 'The Lancashire and Cheshire Operatives' Relief Fund,' and that it had been resolved to send 1,500*l*. to the distressed districts. This was the first instalment of the half-million sterling ultimately subscribed under the auspices of the London organisation. A committee was then started in Manchester, it being thought that relief could be best dispensed locally; and a conference was summoned by the Mayor of Manchester, which resulted in the establishment of the Central Relief Committee, Lord Derby being elected the chairman, Sir James Kay-Shuttleworth vice-chairman, and Mr. John William Maclure hono-

rary secretary. In addition to these two great charitable agencies, the Government—through the Poor Law Board—was not unmindful of its duties, and the passing of the Union Relief Act enabled the boards of guardians of certain unions to obtain temporary aid to meet the extraordinary demands for relief with which they were beset. A feeling of satisfaction was felt throughout the whole of Lancashire that the Poor Law Department at that time was controlled by one who bore the honoured name of Villiers; and on this point the *Manchester Examiner* wrote: 'If the unemployed of these districts wish for a guarantee that their wants will not be neglected by the State in this season of bitter distress, they have it in the fact that Charles Villiers is the President of the Poor Law Board.'

A Public Works Act was also passed, by which local authorities were empowered to undertake works of general public utility. Thus another avenue for relieving the distress was opened, these works being the means of providing work for many of the unemployed. In the summer of this year the Queen, under the title of the Duchess of Lancaster, sent a donation of 2,000*l.* to the Relief Fund, and among the many kindly acts which must ever be associated with the period was the terse telegram, 'From Victoria Relief Fund to the Mayor of Manchester: For relief of the distress we send you 5,500*l.*'—a mark of colonial sympathy which was much appreciated.

In 1863 the clouds began to lift, and the distress decreased slowly but steadily. In December 1862 Mr. Farnall had reported that there were 271,983 relieved by boards of guardians. In June 1863 the number was 159,222, showing a decrease of 112,761. In the winter of 1862 the number relieved by the various boards of guardians and the Central Relief Committee together had amounted to a total of 506,601. In the summer of 1863 this total

was reduced to 264,014, having become less by 48 per cent.; and the acute stage of the famine might now fairly be considered to have passed. The work done by these two relief committees may be recorded as amongst the noblest of the many noble efforts of charity that have adorned the present reign. Up to June 1863 relief had been afforded to the extent of 1,974,203*l.*, received from the following sources:

Central Relief Fund	£685,035
Colonial and foreign	88,856
Sale of consignments	498
Interest on balances	6,791
Value of donations in kind	111,099
	892,279
Mansion House Fund	503,131
Cotton District and Liverpool Relief Funds . .	254,380
Local relief funds	283,979
Strictly local sources	40,434
	£1,974,203

It should be mentioned that the committee of the Central Relief Fund received, in its deliberations, the valuable advice and assistance of Mr. H. B. Farnall, the Poor Law Commissioner specially appointed by the Government, and also the aid of a commissioner appointed to administer the machinery put in motion by the Public Works Act.

Dr. Watts, of Manchester, in his book entitled 'Facts of the Cotton Famine,' thus estimates the losses consequent on that visitation:

Employers' losses, 3 years at £9,500,000 . .	£28,500,000
Workpeople's „ „ £11,000,000 . .	33,000,000
Shopkeepers' losses on wages at 10 per cent. .	3,300,000
Losses on half employers' profit . . .	1,425,000
	£66,225,000

Such are the main features of this sad period. As an eye-witness of many of its incidents, it is impossible for me to withhold an admiring notice of the great patience and fortitude of the distressed operatives, and their uniform

excellence of conduct during the entire term of their privations and losses.

Riots and strikes.

It may fairly be hoped that the era of violent disturbances and riots has, so far as the cotton industry is concerned, passed away for ever. The combinations and the acts of physical disorder and revolt which marked its early history as an organised industry had little reference to any question of wages, but were mainly the outcome of the misery and, it might almost be said, the oppressed and downtrodden condition of the people. It is certain, also, that the cotton trade has been little affected by any restrictive action on the part of unions; and though the workpeople in each of the departments have, for a long time past, been associated in some form of union, the function of those bodies has been chiefly directed to the regulation of wages questions. Cotton, however, has had its strikes and lock-outs, and on no insignificant scale. The first, both as to date and importance, was the great strike in Preston which took place in 1853. For forty long weeks the cotton operatives of that town, under the leadership of Mr. George Cowell, held out against the employers. Though assisted by contributions from Blackburn and other manufacturing towns, the Preston spinners and weavers suffered terrible privations; and, as the result proved, endured them in vain, for the masters eventually prevailed. Many years passed, however, before the town and its industry recovered from the effects of this long-continued blockade. Compared to the great strike in Preston, those which soon followed it at Colne and Padiham were of small importance. But in 1861 an effort on the part of the employers to reduce wages resulted in an extensive strike at Blackburn, in which nearly 30,000 workpeople were involved. On this occasion the operatives, through their representatives, suggested as one of their proposed terms of

agreement a considerable reduction in the time of working, and, consequently, in the production of the mills. They argued that in view of the scarcity of the material, which was at that time severely felt, and the over-production of goods which already existed, relief of an effective character could only be obtained by restricting the exports to over-stocked markets by means of a substantial reduction in the output. The same arguments have since been frequently employed by the workpeople on occasions when a lower scale of wages has been proposed, the object being, of course, by present sacrifices, to produce a scarcity value for cotton manufactures, which would result in higher prices, and consequently higher wages. The contention on the other hand was, that the enhanced cost of production, caused by limited working of the factories, would not only cause still larger losses, bnt would also operate greatly in favour of foreign competition. The great Blackburn strike—though involving, as usual, much suffering to the workpeople—was happily not of very long duration, and terminated after a few weeks' struggle in favour of a reduction of the wages. The employers had for some time past possessed associations of their own body, organised to deal in a combined manner with the wages and other questions advanced by the work-people, and, in consequence of continued unprofitable trade, a demand was made by the masters in 1877 for a reduction of 10 per cent. on the existing scale of payment. This was resisted, and led to a strike which extended over a large area of North-East Lancashire. The struggle entailed infinite loss and suffering not only on the workpeople, but also on the shopkeepers and others dependent on the trade; and, after continuing the fight for two months, the operatives, through their delegates, proposed various terms of settlements, including the submission of the case to arbitration. These proposals were considered by the representa-

tives of both sides, but no agreement was arrived at. Finally, the workpeople, under the influence of privation and disappointment, broke out into open rioting in Blackburn, which ended in the destruction of Mr. Raynsford Jackson's house by fire, and many other acts as deplorable as they have happily been exceptional in connection with such disputes in the cotton industry. This time the masters were again successful, and a reduction of wages was ultimately agreed to. It is satisfactory to record that, after this unhappy conflict, several important disputes were settled by arbitration between the representatives of the masters and operatives, and thus a vast sum of waste, misery, and ill-feeling was averted. The extensive strike which took place in Oldham in 1885 originated, as usual, in a demand for a reduction in wages, based upon the unprofitable condition of the trade. The proposals of the masters were met with the now-established counter-proposition on the part of the workpeople, to submit to a reduction in wages only in connection with a limitation of the production. As a matter of course, much suffering ensued, and a compromise, involving a partial reduction, was finally agreed to. Each successive strike has, however, tended to establish the conviction, both among employers and workpeople, that such violent, barbarous, and wasteful methods of settling wages disputes are unworthy the importance of the trade and the intelligence of those engaged in it. The day is probably not far distant when the peaceful method of arbitration, which has recently gained so much prominence, will be found effective for the adjustment of all differences that may arise.

Improvements in machinery and mills.

When the Queen ascended the throne, the factory system may be said to have been fully developed, and the machinery for preparing, spinning, and weaving cotton was established upon principles invented by Paul Arkwright, Hargreaves,

Crompton, and others for spinning; and Kay, Cartwright, and others for weaving. The leading features and principles of these inventions are contained in the machinery of the most modern mills of the present day. Yet, though the machinery required for the processes of opening, scutching, cleaning, carding, drawing, slubbing, roving, spinning, doubling, winding, warping, dressing, and weaving was fairly complete in principle, it needed the most unremitting attention and skill on the part of the attendants. As regards hand-mules, the work was most laborious, and still required the spinner to effect the changes and to perform many of the operations which are now performed by self-actors.

The machinery was in many instances of primitive construction and materials, and the work most required of our mechanical engineers in the machine-making and cotton trades was to improve, or otherwise replace and supersede, these hand-assisted machines by automatic ones of more suitable design, better materials, and more scientific and accurate workmanship. In 1837 the machinery was bad in design and faulty in construction, many parts being of wood, and requiring not only incessant watchfulness on the part of the workers, but in many instances the greatest assistance in the performance of its operations. The important machines for spinning and cleaning the cotton are now almost fireproof. They possess easy adjustability of feeding-tables and of rollers to the 'beaters;' perfect construction and forging of 'beater arms;' perfect balancing of 'beaters' when finished. Woven wire is now used in the construction of dust-cylinders, and air-tight compartments for leaf, seeds, and waste; there is also an arrangement for forming and compressing cotton laps into five times the weight of the laps formerly delivered. There are simple mechanical arrangements for arresting the motion of the feeder, for

stopping the machine when the lap is complete, and for easily taking it out to supply the next machine.

The characteristics of the modern carding-machines are strength and firmness, combined with good proportion of parts and lightness. The framing is of suitable materials, accurately built and joined and with planed surfaces as bases for supporting the bearings of all revolving parts, whether with fixed centres or with centres required to be adjustable, vertically, radially, or laterally, as is the case in these machines where the teeth of the cards on the cylinders, doffers, rollers, and flats are constantly wearing, and where the revolving surfaces are required to be close, true, and sharp.

The bearings and axles are now lubricated by simple and cleanly means; automatic grinding is substituted for hand-grinding in carding engines.

The modern coiler and revolving can motions, for laying and compressing the sliver delivered by the carding and drawing machines into cans, has greatly increased the contents of the cans and eased the labour of the workpeople. The machines are now stopped by automatic action, either when the cans are empty or when the slivers are broken through accident, or in case of cotton adhering to the rollers, thus preventing waste; also when the cans on the delivery side of the machine are full. Electric 'stop motions' have also been invented, and are at some mills extensively adopted.

The combing-machine, patented in France by Heilmann, was purchased for combing cotton in England by a syndicate composed of fine-spinners and machinists. It was first used for combing cotton of long staple only; but the requirements of the hosiery and lace-making trades, as well as the industry devoted to the production of sewing-machine thread, have caused the combing-machine to be used in the treatment of shorter staple cotton. The machine is now

employed for 'counts' as low as thirty hanks in the pound, where the greatest excellence in yarn is required. Although many other machines have been invented and patented since that of Heilmann was introduced, it still retains its position. The improvements added to the original invention, and the more perfect construction and accuracy of its details and workmanship, have resulted in a machine of the highest excellence.

Differential motions and other improvements were introduced into slubbing, intermediate, and roving-frames more than fifty years ago, but improved appliances in connection with the winding have since been made in them. Very much has also been done to these machines to enable them to bear the increased speed of their spindles and other duties required of them. So perfect, indeed, are they, that all that the workers at them have to do is to *watch* the machine when working, from the commencement of the set to the completion of the full bobbin; to remove the bobbin when full, and to clean and oil the parts of the machine when necessary.

Self-acting mules have been introduced by several inventors, and, amongst others, those of Roberts, Potter, and Smith have competed for the preference of the trade. Improvements have been made in all these during recent years, but ultimately that of Richard Roberts has been most generally adopted. There are now many varieties of his mule by different makers, but all contain the principles first made successful by the genius of the original inventor. This machine was, however, not entirely automatic, as many of its functions had to be performed by the 'minder;' but latterly some of our best mechanical engineers, possessing higher mathematical knowledge and a more scientific education, and being in almost daily intercourse with experts in cotton-mills, have succeeded in making the now really

self-acting mule almost, if not quite, the most wonderful machine in use in any trade. The attendants, minders, &c., have now little more to do than to start the mules, when first set in motion, by putting on the strap, stopping them by pulling it off again at meal-times, at the end of the day, or when the yarn spun has been wound on the spindle in the quantity required to fill the 'cops;' to remove the spun 'cops' from the spindles, and put the parts of the machine in their original position at the commencement of the work.

The limit prescribed for this paper will not admit of an enumeration even of the numerous improvements lately made in the self-acting mule. It may, however, be stated that in 1837 self-acting mules contained 324 spindles each; in 1856 480 spindles each, and were worked by one minder and one piecer to a pair (960 spindles), their united wages being 25*s.* per week, and that the ordinary size of the 'self-acting mule' is now 1,080 spindles. One 'minder,' one 'big piecer,' and one 'little piecer,' are required to work a pair of mules of 2,160 spindles in each pair. The wages are respectively about 36*s.*, 14*s.* 3*d.*, and 10*s.* per week; and the production in pounds of yarn, say from 30's to 40's, varies from 1,760 to 1,310 lbs. per week.

The 'ring and traveller' principle, as applied to throstle-spinning, was first shown in the International Exhibition of 1851, and many improvements have since been made in these machines. They are now largely adopted by the trade for spinning certain 'counts,' both on spools and bare spindles. The maximum speed of this spindle is now about 10,000 revolutions per minute, and the production of 30's yarn is about 36 hanks per spindle, and $1\frac{1}{8}$ lb. per spindle per week.

In winding, warping, dressing, sizing, and weaving machinery many improvements and new appliances for saving labour have been made; notably in arrangements of

mechanism for reversing the motion of the warp beam, and for keeping warp threads taut during the search for broken threads; also for stopping these machines in case of warp threads breaking, or in case of empty bobbins, and when the warp beam is completed. Warp beams can now easily be taken out and changed when full.

In the construction of steam-drying cylinders and coils of pipes, and in arrangements of dividing-rods for enabling one attendant to seek and pick up broken-sized threads, and thus prevent imperfect warps being made, great improvements have been effected. Appliances also for 'letting off' warp beams, for 'taking up' and 'winding on' cloth beams, and for weighting warp beams, so as to equalise the weight on the warp threads as the diameter of the warp decreases by unwinding, have been invented in almost endless variety.

In looms, self-acting revolving 'temples' have replaced the old and clumsy wooden hand temples. Appliances for stopping the loom in case of empty spool or breakage of weft thread from any cause, have been introduced and perfected, and the calico-loom is now a very perfect machine.

Fifty years ago cotton-mills were not fireproof. The rooms had low ceilings, were badly lighted and ventilated, while clumsy shafting and gearing, imperfectly guarded, hung low overhead. The atmosphere, particularly in the cotton-mixing, scutching, and card-rooms, was dusty and unwholesome; the people were emaciated and unhealthy-looking. The mills now built vary from forty to forty-five yards in width, and are generally built on the fireproof principle, with lofty ceilings. The rooms are well lighted and ventilated. The gearing, shafting, and pulleys are high overhead, well balanced, and completely guarded. The atmosphere of the rooms is comparatively pure, and the appearance of the workpeople has undergone a marvellous change for the better.

At the commencement of the reign the export of machinery was prohibited, and thus the labour market at home in the engineering and machine trades was often greatly depressed, whilst many of our trained mechanics left the country, after having acquired their skill, and obtained work abroad in establishing workshops in Belgium, France, and Switzerland. In 1843 some of our leading commercial men and statesmen were successful in obtaining the abrogation of these unwise laws, and many of our skilled artisans returned home to find ample work in a rapidly developing industry. Our workshops, in the engineering and machine-making businesses, became fully equipped; the fuller development of the factory system and a profitable trade created a demand for improvements in machinery, and men of genius applied themselves to solve difficulties and to supply the demand. There resulted a great improvement in the workshop appliances and tools, and more accurate and scientific methods of working prevailed. The drawing-board superseded the rule of thumb, better patterns were made, followed by improved moulding and casting, and an impetus was given to all the trades concerned in the industry.

At the Exhibition of 1851, cotton machinery on a large scale was for the first time shown to the general public, and the whole process, from cotton-spinning to weaving the calico, was practically illustrated. The Exhibition had the effect of stimulating the production of new designs, which included all the most recent improvements. Spinners and manufacturers, who were working machinery 'which had done well enough for their fathers' and which they considered good enough for themselves, saw for the first time what was possible, and even necessary, in the future profitable working of their industry. Large orders were given for the new and improved machinery; and, on the

whole, the Exhibition may be credited with having given a considerable impetus to the trade.

Without disparaging in any way the efforts made and the influence exerted on the trade of cotton-spinning and weaving by the many able inventors who have devoted so much study and genius to the subject, there is one man whose labours during the whole of her Majesty's reign have contributed so materially to the benefit and advancement of the industry that his name should certainly find a place in any record of this nature. I refer to Mr. Richardson, of Oldham. The necessity of a sound scientific education for our skilled mechanics has always been patent to him, and he has lost no opportunity of putting the means of obtaining it within the reach of the young. The many appliances and improvements introduced and developed by Mr. Richardson, and since generally adopted by the trade, are testimonials to his genius in every cotton-mill in the world.

Our largest machine-workshops employed about 200 to 300 workpeople in 1837. Some of our largest establishments now employ 9,000 to 10,000 workpeople.

Many weavers formerly worked only one loom; I believe none had more than two looms. Now, weavers manage four, and in some cases—with the aid of 'learners'—undertake the working of as many as six.

Calico-printing.

The important industry of Calico-printing was first established in Lancashire about the year 1764, and at that period the product of the printer was subject to an excise of threepence per square yard, to which sum another halfpenny per yard was added in 1806. These duties were, however, repealed on the accession of Lord Grey's Government to office, and then, for the first time since the foundation of the trade in England, it was permitted to enter into competition with other kindred industries on a fair footing. Previously to the year 1785, block-printing, aided by the

flat copperplate-printing, was the only mode of producing the pattern.

The important improvement supplied by the cylinder printing-machine was first successfully brought into operation by the firm of Livesey, Hargreaves, & Co. about 1785. The average production of the block process was six pieces of 25 yards each per day, employing one man and a boy, and printing only one colour. The machine, with the same amount of labour, will produce 200 to 500 pieces, of one or more colours, the work being comparatively free from faults, and effected with the accuracy and precision only obtainable by well-arranged mechanical power.

The production of prints in Great Britain was, in 1750, about 50,000 pieces per annum; in 1794 it had risen to 1,000,000, and in 1830 to nearly 8,600,000—a progress almost without parallel in the history of the cotton trade. The removal of the heavy and harassing excise duty, amounting to about 50 per cent., gave a prodigious impetus to the industry, and the output sprang up from 8,600,000 in 1830 to about 20,000,000 pieces in 1852. The increased demand led to rapid improvements in the speed and efficiency of the machinery, so as to reduce the cost of production. The number of colours capable of being placed on the cloth was increased to three, six, ten, and even twenty, forming an endless variety of designs, executed with marvellous speed and precision. These mechanical arrangements have now almost superseded the old system of block-printing, which is chiefly used for large and many-coloured elaborate designs on cretonne cloth. It may be interesting to note some of the most important scientific discoveries and inventions which have, within recent times, contributed to the perfection, beauty, and success of this great branch of our trade.

In 1845 egg albumen was first employed to fix pig-

ment colours, such as ultramarine blue. The white of egg was dried and dissolved in water, then mixed with the colour as a thickening. When the piece was steamed, the albumen in the colour coagulated, thereby fixing the colour on the cloth. Before the discovery of albumen, the brighter shades were produced from decoctions of different woods, such as logwood, peachwood, sapan, &c., and were called spirit colours. They were not fast under the influence either of soap or light, and they possessed the further disadvantage of occasionally rotting the cloth.

In 1854 blood albumen, made from the serum of blood, was introduced, and, being very much cheaper, replaced egg albumen for all but the lightest shades.

Aniline dyes.

In 1856 the introduction of aniline colours gave a great impetus to the print trade. These colours were very fashionable, but unfortunately, after a few years, complaints were made that they were not fast under the influence of light, so most of them went comparatively out of use in the home trade. A methylene blue was, however, introduced by the Badische Aniline Company in 1877—a colour which is fast to both soap and light, and is now much used. Aniline colours are much faster on wool than on cotton.

In 1856, mauve, the first aniline colour, was discovered by Perkins. Other colours from coal-tar followed in quick succession.

In 1859 a colour called magenta, after the battle of that name, was introduced, followed in 1860 by aniline blue. In 1860 aniline black was discovered by Lightfoot. It is the fastest and most brilliant black known, but, on exposure to air containing sulphurous acid, has the disadvantage of turning a greenish colour. In 1865 aniline green and safranine (pink) came in, the latter very fugitive to light. Extract of madder came generally into use in 1866. By its means a perfectly fast print, with red and pinks, could be

obtained without dyeing. When the mordant is mixed with the extract of madder, the same chemical change takes place in the steaming-chest as was formerly effected in the dyebeck. Hitherto the blacks, reds, and pinks had to be printed by machine, and then the brighter colours blocked in by hand. The advantages of the new process are that it enables the printer to print, in the same design, pigment and aniline colours, with black, red, and pink, thereby giving a greater scope for variety, besides considerably increasing the productive power of the machinery.

The year 1869 wrought a great revolution in the chemistry of calico-printing through the discovery of artificial alizarine, which is made from anthracine, a product of coal-tar. Chemists had been working at this material for some years, both on the Continent and in England. In less than five years artificial alizarine was produced in such large quantities as almost entirely to supplant the natural alizarine produced from madder. By its use printers were able to produce the most brilliant dyed scarlet for the first time; and a great scope was thus afforded for new styles, especially in those suitable for the East Indian markets.

In 1876 variety was given to the indigo discharge style through the discovery, by a Mulhouse printer, of a process whereby a pattern with pigment colours such as vermilion, blue, yellow, &c. could be printed on the indigo ground. At this time, also, the introduction of aniline scarlet almost entirely supplanted cochineal. A method of making artificial indigo was in 1880 discovered by a chemist, but it has not met with much success, owing to its high cost and the difficulty of working it, but efforts are now being made to overcome those drawbacks. Recent improvements and appliances in the general processes of the print works have been numerous and important. Formerly, goods had to be hung up in a room called a 'stove,' and there subjected to

heat and moisture from two to five days before being dyed. This process was called 'ageing.' In 1849 Mr. Thom patented a process for 'ageing' goods by passing them through a chamber containing aqueous vapour. The invention remained in use until 1856, when a modification of it was successfully applied by Mr. Crum. The new process completed its work in fifteen minutes, as against two to five days formerly required.

In 1875 a patent was taken out by Cordell and Mather for continuous steaming. By means of this invention the cumbersome process of undoing the ends of the pieces and stitching them together again after steaming is avoided.

The rate of wages paid to the operatives in the print trade is higher than those of any other branch of the cotton industry. Their occupation requires superior intelligence, often some knowledge of chemistry, and great care and exactness in the delicate work.

Bleaching.

In the industry of Bleaching very few important changes have taken place during the last fifty years, either in the chemistry or the mechanical principles applied to the process. The improvements effected have had relation principally to details of machinery, for expediting and perfecting the work, and the saving of time and labour. In these directions a very considerable advance has been made. It is now nearly forty years since the old 'dash-wheel' gave place to the more rapid and efficient washing-machine, and the pieces of cloth are now stitched together, and passed with great rapidity over winches, in an endless coil, from the first stages of their treatment to the various processes to which they are afterwards subjected. Various inventions have from time to time been submitted to the trade, having for their chief object an economy in the time and cost of the primary process of bleaching the cloth. But the most

recent of these, and the one which has perhaps attracted most attention, is that known as the Mather-Thomson or carbonic-acid process. The advantages claimed for this invention are a saving in the chemicals and also in the quantity of water employed, but above all an economy in the process so great as to insure the production of cloth in the white state in the short space of twelve hours, as against the forty hours needed under the present system. So far the invention above alluded to has only been tested by a few firms, and some further experience is needed to secure for it more general adoption.

India and the cotton trade.

The development of our great Eastern Dependency, both as a producing country and as a market for our exports, has been most remarkable. In cotton-growing, however, India has not made all the progress that could be desired. Though the increase in her yield of that staple has been considerable, and great improvements have been made in the quality, cleaning, and packing, much remains to be done, and a closer attention to this important subject on the part of the authorities is most desirable. It is only too obvious that another famine in American cotton would find us in nearly the same position of dependence as that which we occupied on the last deplorable occasion. The quantities of raw cotton imported from India into the United Kingdom are as follows:

	lbs.
1840	77,011,839
1850	118,872,742
1860	204,141,168
1870	341,467,728
1880	207,061,120
1885	145,130,048

The value of the cotton manufactures imported into India in the year 1884–85 was 24,557,834*l.*; that of the raw cotton exported from India in the same year was 13,286,367*l.*;

that of cotton twist, 2,441,101*l.*; and that of cotton goods, 896,928*l.*

The vast population of India, numbering with the Native States over 250 millions, together with the relations of this mass of humanity to our own Government, render the dependency not only at present the most important, but in the future the most hopeful market for our cotton trade. Already we export to her about one-fourth of our cotton productions, which is only a supply of about 2*s.* per head of her population. There is ample justification for the belief that, with full attention to the development of her resources and due regard to the welfare of her people under an economical and efficient system of government, both the prosperity of the country and the purchasing power of its inhabitants are capable of an infinite growth.

The duties which had been imposed by the Government of India on the importation of cotton goods and fabrics into that dependency had always been regarded with dislike by the Lancashire cotton trade, on account of their protective character, the unfair advantage afforded by them to the Indian millowners, and the grievance they inflicted on the native consumer of imported cottons. The agitation for the abolition of these imposts had, however, been steadily resisted both by a section of the Indian officials and also by some economists in this country. It was urged that to India belonged the sole right to decide how her taxation should be imposed, and that the tax on the importation of British cottons, even though it might foster a native industry, was less objectionable than other methods of raising revenue which would probably take its place. The duties which had been imposed in the year 1873 yielded about 800,000*l.* per annum, and were the constant subject of agitation on the part of the Manchester Chamber of Commerce and the commercial bodies throughout Lanca-

shire. Frequent appeals were made both to the Indian and Home authorities to abolish these objectionable duties, and promises were from time to time obtained for their remission so soon as the condition of Indian finance should be thought to justify such a step. Years passed away, however, and nothing was effected, but the agitation gained force as it was seen that the flourishing industry which was growing up in Bombay would ere long constitute a vested interest, which would render the hopes of the repealers still more difficult of attainment. In the year 1878, there being some small or apparent surplus in the Indian budget, the first step was taken in the remission of the duties, and T-cloths, shirtings, and domestics made from yarns not finer than 30's were admitted free. In 1879 a further step was taken by the remission of duty on all grey cloths made from yarns not finer than 30's. These concessions were far from satisfying the Lancashire demand for complete free trade and equality for all manufactures under the same Government, and the agitation continued with unabated vigour. In 1881 an influential deputation from the Manchester Chamber of Commerce waited on Lord Hartington, then Secretary of State for India, to urge the abolition of the duties which still remained on certain classes of grey goods, and also on bleached, dyed, and printed fabrics; and in May 1882 the efforts of Lancashire were crowned with success by the total abolition of all the remaining duties.

The silver question.

Though anything approaching to a dogmatic treatise on the question of Currency is far beyond the scope of my present undertaking, so great has been the influence on the cotton trade of the fluctuations in the relative value of silver during recent times that it would be impossible to pass over the subject without notice. A Royal Commission has been specially appointed to consider and report on the

question; to this body, therefore, and to the numerous private and public authorities who are now eagerly discussing the problem, I shall refer the reader for conclusions as to the soundness respectively of the bimetallic and monometallic systems.

It could hardly be expected that the great disturbance in the relations and distribution of silver—which began with the demonetisation of that metal by Germany in 1873, and was quickly followed by the suspension of its free coinage in France, Belgium, Switzerland, and Italy—could be without effect in markets such as India and China, which not only provide enormous custom for the manufacturers of Lancashire, but whose money transactions are almost entirely effected through the medium of silver.[1]

Whether these serious disturbances are destined to continue or to have only a temporary influence on the cotton trade of Lancashire, whether they are capable of adjustment by the operation of natural causes or only by legislative action, I shall not here discuss. I think, however, it will hardly be disputed that, coincident with, and possibly in consequence of, the great fall in silver exchange, there has been an enormous development in the manufacturing establishments of India. Bombay now almost rivals some of the large manufacturing towns of Lancashire in the size and equipment of its cotton-mills. There are in that city alone some seventy mills fitted with the best machinery and appliances, in many cases earning profits superior to those obtainable in England. Already those establishments have deprived Lancashire entirely of her trade in some large classes of cloth and yarn formerly exported to India, while they are proving formidable competitors in the markets of

[1] The fluctuations in the price of bar silver in London, between 1859 and 1885, ranged from 62⅜ to 47¼; the value of the rupee varying in the same period from 2*s.* 0·325*d.* to 1*s.* 7·308*d.*; while in 1886 the quotations fell as low as 42, and the intrinsic value of the rupee to less than 1*s.* 5*d.*

China and Japan. From whatever cause a return to a steadier level of exchange may arise, it will certainly be hailed with satisfaction both by British merchants and bankers, whose ventures and operations have of late years been conducted under conditions of uncertainty with which neither prudence nor foresight have enabled them successfully to cope.

Commercial treaties.

In 1860 the cotton trade of England entered on entirely new relations with France, and indeed with the Continent generally, through the Commercial Treaty negotiated by Mr. Cobden. Previous to that date most of the staple products and manufactures of this country were practically excluded by the French custom-houses; but under the conventional tariff provided by Mr. Cobden's treaty, a considerable business sprang up between the two countries. The attempts made by the English Government in 1881 to renew and improve the conventional tariff, through the negotiation of fresh treaty arrangements with France, were unsuccessful. In May of that year a new general tariff was promulgated by the French Government, applicable to all nations, under which many important changes were made in the old tariff. Those alterations related both to the classification of the duties applicable to cotton tissues and yarns, and provided in most instances a considerable increase of the duties. Both the principles and operation of Mr. Cobden's treaty have been subjected to much criticism even on the part of staunch advocates of Free-trade, and it has been urged by some authorities that the transaction gave countenance and support to the principle of retaliation. Mr. Cobden, however, claimed the right to advance in the direction of Free-trade unfettered by economic formulas; and, though the result of his great work of 1860 has been disappointing in some respects, it has certainly produced many excellent results. Each recent commercial

treaty has recognised the 'most favoured nation' principle, and thus every fresh reduction of duty has been shared by the confederation of European nations concerned in the system of treaties. By this means such countries as England, France, Holland, Belgium, the Zollverein, Austria, and Italy, have eliminated the principle of monopoly and exclusive privilege, each one enjoying any reduction of duty made by another, and thus forming a network favourable to the final abandonment of commercial restrictions. The trade between England and France alone shows a very considerable increase under the influence of the arrangements inaugurated by Mr. Cobden, our exports of cotton manufactures having risen from an almost nominal amount to the following sums in 1885:

	£
Cottons entered by the yard . . .	877,371
,, at value	170,639
Cotton yarns	830,866
Total	£1,878,876

Factory legislation.

The Factory and Workshops Act of 1878 practically embodies factory legislation as it exists at the present time. That Act repeals, either wholly or in part, the previous enactments bearing on the subject, beginning with the earliest legislation in the year 1802 down to the various Acts relating to factories and workshops passed in the years 1867, 1870, 1871, and 1874. It is, in fact, a consolidation Act, in addition to being an amending Act. Its chief provisions may be shortly summarised as follows:

1. Factories and workshops shall be kept in a clean and healthy condition, and the sanitary arrangements generally shall be under an inspector, who, for the purpose of seeing that they are properly carried out, has power to employ, when inspecting, a medical officer of health, inspector of nuisances, or other sanitary officer.

2. Arrangements are made as to the fencing of machinery, and where machinery is dangerous and not already fenced, the inspector shall serve a notice on the occupier of the factory requiring him to fence it. Should the occupier deem it inexpedient to comply with the notice of the inspector, the matter can be referred to arbitration.

3. Restrictions are placed on children, young persons, and women cleaning machinery while in motion.

4. Important provisions are made as to the hours of labour for children, young persons, and women. In textile factories the hours for *young persons and women* are limited to twelve hours a day, except on Saturday, when they are to stop at either one or half-past one, according to the length of time allowed for meals. On every day except Saturday two hours at least must be allowed for meals, and on Saturday not less than half an hour. The working of *children* in textile factories is limited to the system of employment either in afternoon and morning sets, or of employment on alternate days only.

5. Provisions are made as to the education of factory children, and no young person can be employed in a factory under the age of sixteen, unless a certificate of fitness for employment has been granted by the certifying surgeon of the district.

6. Special provisions are made for the protection of children, young persons, and women engaged in factories where wet-spinning is carried on.

7. In print, bleaching, and dyeing works, the period of employment and the time allowed for meals are the same as in the textile factories.

Whatever may have been the fluctuations and vicissitudes during the past half-century in the fortunes of the masters, merchants, and others engaged in the higher

grades of the cotton trade, there can, I think, be no doubt as to the steady improvement which has taken place in the condition of the workpeople. Not only have their wages considerably advanced, but this advance has been accompanied by a substantial reduction in the hours of labour, and in many cases by a higher purchasing power for their money in relation to important necessaries.

Condition of the cotton operatives.

Undoubtedly the cotton operative of to-day, as compared with his fellow of fifty years ago, lives better, is better housed and better clothed. Of course the educational advantages enjoyed by his children since the passage of the great measure of 1870 are immeasurably greater than formerly existed. Not alone has the leisure time of our workpeople been extended, but their opportunities of employing it pleasantly, healthfully, and usefully have been equally amplified. Cheap and rapid means of locomotion now place a great variety of distant and attractive scenes within easy reach of the working classes. The free libraries, the science and art classes, the excellent courses of the City and Guilds of London Institute, and latterly the technical schools, which in towns like Manchester, Oldham, Preston, and other large manufacturing centres, have been founded for the instruction of artisans in the sciences and arts which underlie their industries, constitute a mass of advantages to which the workman of 1835 was almost a stranger. It remains for us in the future to build on this fair foundation, especially in emulating some of our Continental rivals in the further organisation of secondary and technical schools, and thus insure to our operatives the full advantage of those natural gifts which render them beyond comparison the best workmen in the world. It is not surprising that, under the influences above enumerated, the social habits of our working population have experienced a marked change for the better. Drunkenness and pauperism

have diminished, and the figures relating to crime, especially among the juvenile population, are more favourable, while habits of thrift show a strong and substantial growth.

Their earnings.

Any attempt to estimate the increased earnings of the workpeople could only result in an approximation to the facts of the case, for there is variety in the wages, even of the same industry, in various districts. Nor can the earnings of the present time be fairly measured by any former standard, for the altered speed of machinery, combined with the great extension of labour-saving appliances, has enabled the workman of to-day to produce infinitely more than formerly as the return of his wages. The important inventions which came into use between 1840 and 1850 had the effect of greatly increasing the number of looms that each weaver could attend to, and since the accession of Queen Victoria the actual earnings of weavers have probably increased more than forty per cent. This increase does not, of course, represent higher pay for a given amount of work, but the increased effectiveness of the machinery and workmen combined.

In the spinning and carding departments the advance in wages was delayed between 1846 and 1856 through the influx of Irish labour, consequent on the potato famine. Those poor people were glad to enter the mills and commence at once to earn wages; but, during the last thirty years, the percentage of increase in the earnings in those departments has been considerable. Taking factory labour as a whole, it may safely be said that each worker turns out twice as much work as he did fifty years ago, and that he earns about fifty per cent. more in consequence of the increased production. It must not be forgotten that wages rose with great rapidity after the repeal of the Corn Laws. As a result both of recent legislation and the action of the

workpeople themselves, the hours of labour in the cotton textile industries have undergone a reduction of about twenty per cent., and, as I have before stated, with the effect of producing an increased rather than a diminished output.

Their food.

I have already alluded to the great improvement in the nourishment of our workpeople; indeed, the food, especially in regard to flesh meat, which was thought sufficient fifty years ago, would not be tolerated now. Both as to food, clothing, and nearly every necessary of life, the co-operative stores and societies, which have now become universal in the manufacturing districts, have helped the workpeople to obtain their supplies on the most favourable terms; and the building societies have helped them, in a vast number of cases, to become owners of their own dwellings. While it cannot be questioned that, within recent years, certain articles of everyday consumption have become considerably cheaper, there are others which have sustained little alteration, and in the important item of meat the position of the purchaser is much less favourable than it was between 1840 and 1850. It must be further borne in mind that the cotton operative is now not only a large and regular consumer of meat, but also of many other articles which in the early part of the reign would have been regarded as luxuries; and this greatly increased demand has, of course, direct relation in many cases to the advance in price. Whether we prefer to attribute this movement to the increased purchasing power of the sovereign or to the fall in the price of commodities, the fact remains that, in a list of necessaries and even of luxuries almost too numerous to detail, the position of our workpeople has undergone a marvellous change for the better. Professor Levi gives the following figures as to the purchasing value of the sovereign:

Year	Flour	Beef	Butter	Coal
	lbs.	lbs.	lbs.	lbs.
1840	115	86	24	198
1850	190	93	32	280
1860	145	44	25	235
1870	163	40	18	255
1880	173	39	21	300

It may also be interesting to note, from the following table, the remarkable manner in which the consumption of meat, and also of bacon, hams, &c., by our workpeople has affected the imports:

Imports	1850	1860	1870	1880	1885
	No.	No.	No.	No.	No.
Oxen, bulls, cows and calves	66,462	104,569	202,172	389,724	373,078
Sheep and lambs	143,498	320,219	669,905	941,121	750,886
	cwt.	cwt.	cwt.	cwt.	cwt.
Bacon and hams	352,461	326,106	567,164	5,334,648	4,058,454

The returns of the Post Office and Trustee Savings Banks cover only a portion of the period under review, and the use of those institutions is doubtless shared by the class of domestic servants and many others besides the industrial populations; but it cannot be doubted that the latter class, by their improved habits of economy and thrift, have done much to swell the returns which, even in the last five years of comparative depression, show such encouraging results.

	£	s.	d.
In 1836 the deposits paid into the Manchester and Salford Savings Bank amounted to . .	101,112	18	11
In 1846 they were	193,009	8	11
„ 1856 „	263,041	11	5
„ 1866 „	346,999	1	6
„ 1876 „	362,207	17	8
„ 1886 „	614,791	13	5

These figures show a remarkable increase during the last ten years, several of which are reputed to have been

times of severe depression in the cotton manufacturing districts.

Co-operation.

Co-operation may probably be regarded as the most significant movement now at work among the industrial classes. Carlyle has given his testimony to its importance by declaring that, 'This that they call organisation of labour is, if well understood, the problem of the whole future for all who would in future govern man.' The movement is essentially a modern one, having sprung into existence in the lifetime of the present Sovereign. Its original principle was the division of the entire profits among the actual *producers*. But this plan of division has been greatly altered, and the joint-stock principle has been largely employed, with the effect of establishing many important manufacturing companies. In and around the town of Oldham these companies are numerous and flourishing. In the cotton-spinning industry 'Oldham Limiteds' have become standard institutions, and no doubt the day is not distant when, not only in the cotton but in many other large staple industries, the manufacture will pass more and more into the hands of the workpeople themselves, who will be able to organise, direct, and conduct it without the aid of the wealthy capitalists, thus becoming practically their own masters and employers. Whatever prejudice may exist concerning these co-operative companies, there can be no doubt that they have weathered the wave of depression through which we have recently been passing remarkably well. The testimony of the late Lord Derby as to the usefulness of these societies and of the qualities which they call forth is valuable, proceeding as it does from an eminent statesman, and one who had a practical acquaintance with the cotton districts. He said: 'The societies known by this name comprise provision and clothing stores and flour mills, which are conducted on

co-operative principles; but cotton manufactories called co-operative are generally, if not universally, joint-stock companies of limited liability, the capital of which has been subscribed in small shares chiefly by workmen in the cotton district, and which are often built and conducted with the aid of loans. They have arisen out of motives which do the highest honour to the operative classes.'

Foreign competition.

It would hardly be reasonable to expect that, in the midst of the great progress and development of our own cotton trade and manufacture, our Continental and American rivals would remain stationary; nor have they done so. The maritime position of England, her cheap and abundant coal supply and well-trained labour, together with the enterprise and ability of her merchants and manufacturers, have given her a long start in the race, and one of which she need not, and probably never will, lose the advantage. But that she has no monopoly under these advantages is proved by the rapid strides which Continental countries have made in recent years, not only towards supplying their own requirements, but to some extent towards becoming competitors with us in neutral markets.

The consumption of raw cotton has increased—

In England	from	1,101	millions of lbs.	in	1870	to 1,404	in 1880
„ the United States	„	530	„	„	„	961	„
„ Germany	„	260	„	„	„	390	„
„ France	„	250	„	„	„	340	„
„ Other countries	„	239	„	„	„	649	„

These figures should, however, be considered in connection with the fact that the English production per spindle is higher, and the average fineness of our productions greater, than is the case, with few exceptions, on the Continent. Our Continental neighbours certainly strive, and in some cases successfully, to protect their own markets against our goods by the imposition of duties; but that very expedient

must render it difficult for them to compete in neutral markets with our commodities, produced under the cheapening and stimulating influence of our Free-trade system. There seems no evidence to show that the recently developed industries of the Continent are seriously threatening us in distant markets; but they nevertheless impose on us the necessity of increased economy in various departments, the production in many cases of larger quantities at smaller profits, and the adoption to the full of every possible educational, scientific, and mechanical advantage enjoyed by our rivals.

It would be inconvenient to burden these pages with the infinite variety and number of statistics which would be necessary to illustrate fully the manifold developments of our import and export trade in cottons during the period under review. Some impressions may, however, be gathered from the following short table showing the increase in the value of cotton exports between 1830 and 1885:

Value of Cotton Yarns and Manufactures of all descriptions exported.

1830	£19,428,000
1850	28,257,401
1860	52,912,380
1870	71,410,131
1880	75,564,056
1885	70,976,887

Reduction in cost and time of export.

The changes which have taken place in the methods of conducting this enormous trade are many and various. Perhaps the most noticeable feature of recent years is the nearer approach of the producer to the consumer through the reduction of intervening expenses and agencies. In many cases the cotton spinner and manufacturer of to-day deals directly with the cotton producer on the one hand, and with the merchant shipper on the other; and in nearly all cases the old charges for brokerage and agency have

experienced considerable reduction. Fifty years ago the commissions charged for selling cotton goods in India, including guarantee of sales and discount on remittances, amounted to from 8½ per cent. to 5 per cent., to which was added about 2½ per cent. for sundry charges for landing, storing, and 'Godown' rent. These are now reduced to a total of about 4 per cent., though the downward tendency of the latter charges was checked by the Indian Mutiny. The charges for packing and shipment have also been diminished by 1½ per cent. or 2 per cent.; while the opening of the Suez Canal, and the consequent development and competition in steam transit, have produced a marvellous economy of cost and time on the old system of shipment. Mr. Goschen has observed that the carriage of a ton of goods sent from Manchester to Bombay, including the railway fare to Liverpool, the Suez Canal dues, and the freight, is now little more than the price of a second-class ticket from London to Manchester. The shortening of the voyage by the substitution of steamers for sailing vessels, and the adoption of the Suez Canal route instead of the old route round the Cape of Good Hope, has reduced the time taken in the delivery of goods from the warehouse to the port in India from six or seven months to about six weeks; which is equivalent to a diminution of about 2½ per cent. if the additional rent and insurance under the old system, added to the loss of interest, be taken into calculation. The increase of telegraphic communication, and recently to some extent the use of the telephone, have tended to destroy the old custom of keeping large stocks of goods stored in the warehouses of Manchester or in the 'Godowns' in India, and sales are often made in Calcutta or Bombay of goods which have yet to be manufactured, and even bleached or dyed, in Lancashire. The 'Banians,' or native dealers, now send to England a considerable number of direct orders, and several of the

principal 'Banians' have their own agents and representatives in Manchester, who ship direct to their orders.

Conclusion.

The settled government at home, together with the rapid advance in the freedom and efficiency of our institutions during her Majesty's reign, have contributed much to the success of the cotton trade as well as to the general commercial progress of the country. Enterprise has been fostered, and a remunerative field afforded for inventive and mechanical skill. Our command of capital, the capability of our merchants, and the unparalleled efficiency of our workpeople have combined to place our cotton industry in the very forefront of the world's commercial organisations. Nor must it be forgotten that the humid climate of England lends itself in a special manner to the successful manipulation of the fibre. With such advantages, natural and acquired, the great forward march of the cotton trade during the last fifty years may not be altogether surprising. It is not unreasonable to anticipate that, through the maintenance and development of those happy conditions which have *hitherto* waited on its progress, the future history of this branch of our commerce and industry will be one of continued pre-eminence and success.

JOHN SLAGG.

THE IRON TRADE AND ITS ALLIED INDUSTRIES.

Short introductory and statistics.

In the middle of the last century the manufacture of iron in Great Britain was all but entirely extinguished. Had this calamity not been averted, the reign of Queen Victoria, instead of having been marked by the progress which has pre-eminently distinguished it, might not have greatly differed from the reign of Queen Elizabeth. In a volume intended, among other subjects, to mark the march of industry and its influence on society during the last half-century, some account of what has been done for and with iron could not properly be omitted.

Fifty years ago the quantity of crude or pig iron produced in Great Britain was about 1,120,000 tons. Of this about 235,000 tons was required for the various articles sent out of the country either in the form of the raw or of the manufactured metal. The balance, added to 25,000 tons of imports, makes a total of something like 910,000 tons, which represented the consumption of the inhabitants of the British Isles for 1837. Taking their population to have been 26,000,000, we have about 78 lbs. of pig iron used for each inhabitant during the year in question.

The foreign iron imported consisted chiefly of malleable bars of superior quality, made exclusively by means of charcoal. It was used principally in the manufacture of steel for cutlery, &c.—an art in which Sheffield during

the last two or three hundred years has achieved a world-wide reputation. Practically, therefore, this imported iron, so far as competition with our home produce was concerned, might almost have been regarded as an entirely different metal from that of British manufacture. Such, however, was the unwillingness of our ancestors to receive any article of foreign origin, that the Sheffield steel industry was crippled at one time with an import duty on its raw material amounting to nearly 8*l.* per ton. Before the end of 1848, and since then, iron of all descriptions has been admitted free of any payment to the national exchequer.

Under our Free-trade policy the unimpeded importation of iron has grown to proportions so considerable that it now amounts to nearly one-half of what was the entire consumption of the country in 1837. In other words, it is now equivalent to more than 420,000 tons of the metal in its crude form of pig. Coincident, however, with this increase of our dependence on other nations for a portion of the iron we use, our exports have risen in a still more marvellous manner. To provide for this section of our trade, not far short of 5,000,000 tons of pig iron was absorbed in 1882. At the same time, our home consumption, instead of remaining at 78 lbs. per head of our population, at which it stood fifty years ago, is now nearly 290 lbs. To meet these additional demands, the annual production of pig iron in Great Britain rose from a little above 1,100,000 tons in 1837 to about 8,500,000 in 1882.

While the iron manufacturers of our own country were adding so largely to their establishments, other nations were far from being idle. The recorded figures we possess are not sufficiently ample to enable us to estimate the exact dimensions of the iron trade at the beginning of the period we are describing. Approximately, however, the two rows of figures below will give a pretty fair idea of the growth of

the world's make of pig iron between 1837 and 1883, which latter year has never yet been surpassed.

	1837	1883
United Kingdom	1,120,000	8,500,000
United States of America . .	300,000	4,600,000
Other nations of the world . .	1,330,000	7,900,000
Total	2,750,000	21,000,000

Extended use of iron.

It is, of course, needless to say that no increase in the population of the world in the last fifty years can account for the enormous additional production of iron which has taken place during the same period. Such being the fact, we are naturally led to conclude that the metal in recent times has either been applied to fresh uses or its consumption for purposes which are not new has been extended beyond anything known in the previous history of the world. The present communication will tend to show that both these causes have been concerned in the increase referred to.

Improvement of processes.

For an explanation of this great change, it would occur to most minds to ask whether some important ameliorations in the processes for obtaining iron had not permitted its application to purposes from which a high price would have excluded it.

One of the objects of this narrative will be to answer such a question, and to point out the manner in which newly developed fields of iron ore, assisted by greatly improved means of transport, have conduced to lower the cost of the metal.

Changes in prices of iron.

Let us first dispose of the facilities afforded to consumers by a reduction in the market value of the commodity. As is well understood, iron enters into consumption under its three forms of *cast iron*, *steel*, and *wrought iron*. It would, however, be inconvenient to occupy much space here with figures; and as pig iron is now and has long been considered, except under exceptional circumstances, an indis-

pensable stage of the manufacture, we will confine our attention to it as a comparison of value.

Table showing Average Selling Prices of Ordinary Pig Iron for Fifty Years, over Periods of Five Years.

Periods ending	1841	1846	1851	1856	1861	1866	1871	1876	1881	1886
Price per ton . .	*s. d.* 77 0	*s. d.* 63 6	*s. d.* 51 7	*s. d.* 54 11	*s. d.* 50 6	*s. d.* 46 8	*s. d.* 46 9	*s. d.* 75 11	*s. d.* 43 3	*s. d.* 35 2

Owing to great irregularities in the demand, it is not in the nature of things that violent fluctuations of values should not occasionally occur in an article like pig iron. This happened in 1845, and again in 1873, when that made in Scotland was sold at 5*l.* 10*s.* in the former and at 7*l.* 5*s.* in the latter year. Other descriptions of iron were correspondingly affected during the years in question.

It is evident, however, that the figures given above indicate, on the whole, a continuous decline since 1837 in the price at which pig iron could be purchased; indeed, during the last months of 1886, Cleveland metal was bought at 6*s.* per ton below the named average price of the year.

It must not be inferred from what has preceded that the reduction in the market price of pig iron was always a consequence of a diminution in the cost of manufacturing it. A sudden increase in the demand has, from time to time, given rise to an extension in the productive powers not only of our own but of other nations. On this demand subsiding, as has happened at various periods in the history of the trade, the powers of supply exceeded the requirements. During the eight years ending 1879 the make of the world fluctuated between 13,439,000 tons and 14,689,000 tons, the average of the whole being 13,950,000. The make was forced up to 18,077,000 tons in 1880, and reached 21,063,000

tons in 1883. This was in excess of what was needed, and consequently stocks, which in the United Kingdom in a healthy state of trade averaged about 500,000 tons, ran up to 1,809,000 tons in 1884. Hence the low prices which have prevailed for the last few years.

Changes in sites.

The circumstances which originally determined the site of our ironworks have undergone considerable changes in recent times. A century and a half ago the position of the ore was the chief guide in the selection, because it was rare that woods to supply the charcoal and water to furnish the power were at any great distance from the intended mine. The county of Sussex affords a case in point, until there, as well as in other localities, the exhaustion of the forests reduced the smelters to great straits for want of fuel. It was the dearth of charcoal that threatened the existence of the British iron trade in 1740, when the annual make fell to 17,350 tons. From this fate it was rescued by the perseverance of Abraham Darby, who succeeded, where Dud Dudley had failed about a century before, in smelting with pit-coal.

One hundred years ago Great Britain produced 68,300 tons of pig iron, of which 53,800 tons was made with coked pit-coal. For this quantity 85 blast-furnaces were employed to do the work now capable of being performed by three furnaces of modern construction.

Water-power, used for driving the blowing and other machinery needed in the process, was liable to interruption from frosts in winter and droughts in summer. From this state of dependence on the seasons, the steam-engine of James Watt afforded a perfect relief towards the end of last century.

Darby's labours and those of Watt had the effect of transferring the blast-furnace from woodland districts to the vicinity of the coal-pits, where, in many cases, the clay

ironstone of the carboniferous formation, as well as the fuel, could be had at a moderate price.

Such was the position of the iron trade about the time at which the present history commences, when less than 1,250,000 tons of pig iron represented the make of the kingdom for the year 1839. It was produced in the localities given below at the average rate of 64 tons per week from each furnace:

	Tons
Wales	487,680
Staffordshire	364,413
Shropshire	80,940
Derbyshire	34,372
Yorkshire, West Riding	52,416
Gloucestershire	18,200
Northumberland and Durham	13,000
Lancashire (charcoal)	800
Scotland	196,960
Total	1,248,781

Transport, mode of, in 1837.

As a means of transport in those days, canals were largely employed; but had it been necessary to contemplate any approach to the present output of iron, the capacity of this mode of inland navigation would, in all probability, have been speedily exceeded. In a perfectly level country, canals might no doubt have been constructed on a sufficiently large scale to accommodate the traffic. Such a condition as we are supposing is, however, not easily met with in Great Britain; and to pass over an elevated ridge of country, locks are needed, which require to be supplied with water to raise as well as to lower the loads passing over them. For such a volume as would be necessary for conveying the traffic of a large ironmaking district, added to the ordinary demands, not even a river having the watershed area of the Tees would suffice. As matters now stand, its powers, for domestic and manufacturing purposes alone, have to be supplemented by the construction of large storing-

reservoirs, in which the floods of the wet seasons are gathered in reserve for the times when little or no rain is falling.

Railways.

From what in many cases would have been an insurmountable impediment to the development of such an iron trade as that which has located itself on the banks of the very river just named, a road of the metal produced by its aid has afforded all the necessary accommodation. This mode of transport had, as is well known, been in use long before the establishment of the blast-furnaces and rolling-mills of Cleveland, but in a form little able to meet modern requirements. To this position iron roads only rose after the improvements introduced into the locomotive. These improvements, the rapid generation of steam being the most important, have enabled engineering science to compress within the very compact space of a railway engine, machinery equivalent to 600 to 700 horse-power.

In 1834, or nearly ten years after the opening of the Stockton and Darlington Railway—the first public undertaking of the kind in the world—its passenger trains consisted of a single carriage drawn by one horse. In it an average of 14 persons were conveyed on each journey, 950 being the total weekly number. Out of this germ has grown an institution on which, in the United Kingdom alone, have been transported in one year nearly 700,000,000 human beings, 190,000,000 tons of merchandise, and close on to 80,000,000 tons of minerals.

Causes of changes of localities.

Amid the revolutions which have taken place in the circumstances connected with the manufacture of iron in the British Islands, we cannot feel any surprise at vast changes being apparent in the different localities in which it has been followed during the past half-century. As the figures already given are sufficiently correct for our purpose, they will be contrasted with those of 1882, which latter

was the year of the largest produce of pig iron we have known in this kingdom.

	1839	1882
	Tons	Tons
North-Eastern district of England, embracing Northumberland, Durham, and North Riding of York	13,000	2,712,601
Scotland	196,960	1,126,000
Wales and Monmouthshire	487,680	987,572
Staffordshire	364,413	523,244
Cumberland and Lancashire	800	1,742,180
Lincolnshire, Northamptonshire, and Notts	nil	466,761
Derbyshire	34,372	372,650
Shropshire	80,940	80,475
West Riding of Yorkshire	52,416	321,430
Wiltshire	nil	52,991
Worcestershire	nil	150,776
Forest of Dean	18,200	nil
Total	1,248,781	8,536,680

The changes which have taken place are, in reality, much more considerable than a mere inspection of the quantities of iron as set forth in these two columns would indicate. On this head, however, a little further explanation will be found at page 207 and following pages.

North-Eastern district, Cleveland.

The most remarkable change perceptible in the two sets of figures just given is that of the North-Eastern district, the production of iron there having risen from 13,000 tons in 1839 to 2,712,601 tons in 1882. The existence of ore in connection with the geological measures which form the Yorkshire coast between Whitby and the mouth of the Tees had been long known, for it was gathered in detached pieces on the beach so far back as 1745, for the purpose of being smelted at a small furnace which had been built near Chester-le-Street, in the county of Durham. It was, however, not until 1836 that a regular seam of the mineral belonging to the lias measures was opened out a few miles from Whitby in the valley of the Esk, the produce so obtained being conveyed by the sea to the Tyne, and subsequently to the Tees. In the next ten or twelve years

several furnaces were erected in Northumberland and Durham, in order to smelt the ironstone of the carboniferous formation. By means of this ore and that brought from Whitby, the make of pig iron in the North-Eastern district was raised to about 150,000 tons so early as 1850.

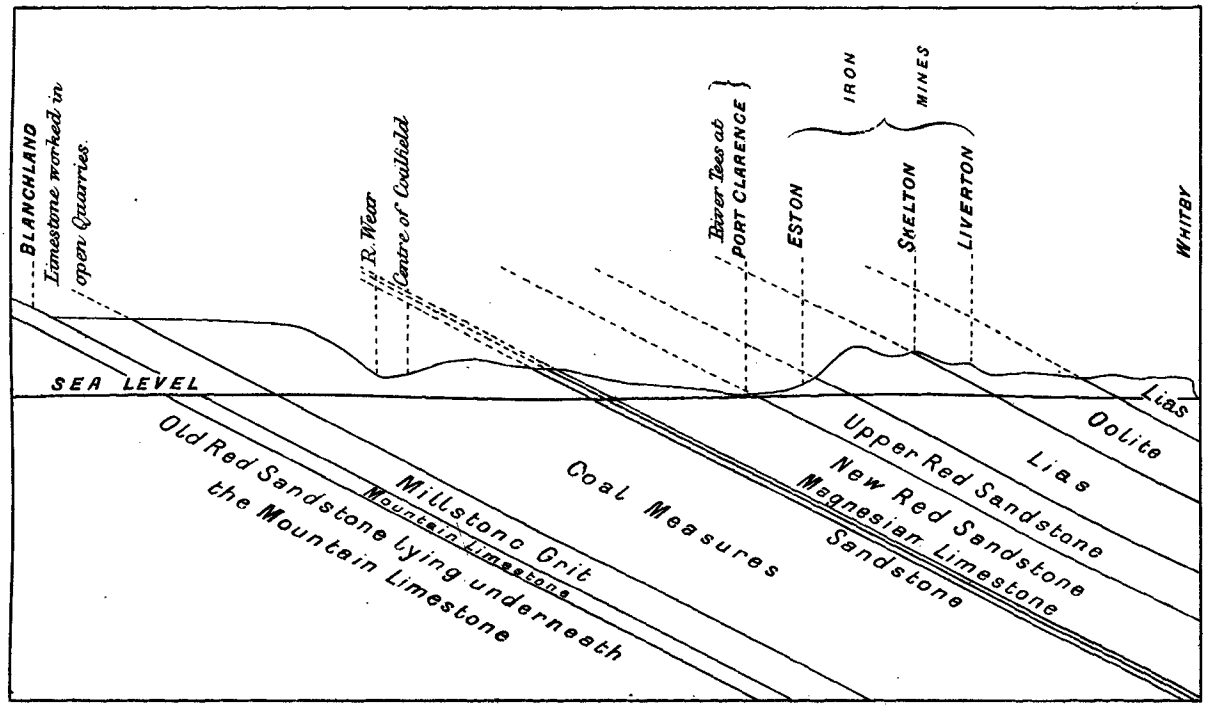
It was in that year that the bed of ironstone worked near Whitby was traced by Mr. John Vaughan to the neighbourhood of Middlesbrough, where, being within easy reach of the Durham coal-field, extensive smelting works were speedily erected. The result has been the rapid creation of the largest ironmaking district in the world, preceded by a speedy abandonment of all the ironstone pits which had been commenced in the two more northern counties.

There are other conditions required, besides the mere possession of a cheaply wrought bed of ironstone, to enable a country to produce iron and place it in the markets of the world to the extent which has marked the progress of Middlesbrough. These conditions, in what is now known as the Cleveland district, will be best understood by a short account of the geology of those portions of the counties of Durham and Yorkshire from which the minerals necessary for the manufacture of pig iron are obtained.

Cleveland geology.

An imaginary line drawn from Blanchland in the county of Durham in a south-easterly direction, and reaching the sea near Whitby, would have a length of about sixty miles. The cliffs on the coast near this town, and from there to the north towards Saltburn, are composed of lias rocks. The strata upon which the lias formation rests are those of the new red sandstone, and following them come in succession the magnesian limestone, the carboniferous rocks, and the mountain limestone. This enumeration comprises the geological ages which concern the subject of this communication.

IDEAL SECTION FROM BLANCHLAND TO WHITBY 62 MILES.



Horizontal Scale 10 Miles, and Vertical Scale 2000 Feet to an Inch.

In the event of the above-named deposits retaining the thickness on the coast which they have been ascertained to possess inland, the upper surface of the mountain limestone would be nearly 7,000 feet below the sea-level. There is further abundant evidence to show that the strata composing these formations must originally have occupied a horizontal position, so that, had no change taken place in this respect, the coal would have been in a situation entirely beyond reach by any mining appliances with which we are acquainted. Happily for the commercial prosperity of the locality, this part of the earth's crust, in the direction of our imaginary line, has at some period of its history undergone a mighty alteration in the matter of level. It would appear—either by a depression of its eastern or an elevation of its western boundary, or by both movements combined—that the different rocks composing it, rise as we leave the coast in a western direction towards Blanchland. This will be easily understood by means of a diagram on which the relative positions of the various formations are set out. From this it will be perceived that the present surface cuts off the continuation of a portion of the strata, a result which is ascribed to the action of water or ice. The effect of this latter change—or denudation, as it is called—brings the western portions of the lower members of the group within easy reach, by means of pits or other well-known mining contrivances. At an intermediate point between the extremities of our line it is intersected by the Tees, which has been selected as a convenient point for the minerals to meet—i.e. the limestone and coal from the west and the ironstone from the east, the river itself affording the means of exporting the produce of the furnaces.

Tees' improvement.

For the purposes of navigation by such vessels as are now in common use, nature left art a good deal of work to perform on the Tees. Its sinuous course had to be

straightened to enable a modern steamer to pass without simultaneously striking both banks of the river. The main stream almost lost itself in a wilderness of mud presented by its wide estuary at low water. To remedy these defects the current had to be confined within training walls, rock and clay had to be dredged to obtain the necessary depth of water, and enormous breakwaters have been and are being built of scoria from the iron furnaces. The result has been a river navigable by vessels of the largest size and the exclusion of the waves from the North Sea, amid which in former times many a fine ship and many a brave man prematurely ended their lives.

Changes in population of Cleveland

As the effect of the introduction of so large an amount of labour on the population may not be without its interest, the following figures are given bearing on this question. They commence with the census year of 1851, and end with that of 1881, between which two dates the discovery and development of the Cleveland ironstone near Middlesbrough may be said to have taken place.

	1851	1881	Increase
Population of Darlington	12,452	35,100	22,648
„ Stockton-on-Tees . . .	10,172	41,015	30,843
„ Middlesbrough . . .	7,631	55,288	47,657
Population of North Riding, exclusive of Middlesbrough	207,588	290,972	83,384
Men employed in coal mining and limestone quarrying for iron-making in the county of Durham, estimated at 20,800 men and boys, considered equal to a population of souls—say	—	—	52,000
Total	237,843	422,375	236,532

The North Riding of Yorkshire, with the exception of the iron industries of Cleveland, being agricultural, the increase of population of this division of the county is entirely set down to the growth of the iron trade. From

the nature of the data the calculation must necessarily only be regarded as one of an approximate character.

We can scarcely take leave of Middlesbrough without a reference to the name of Pease. To the grandfather of the present generation, and to his sons, is mainly due the construction of the Stockton and Darlington Railway. This undertaking was begun at a time when grave doubts were entertained respecting the commercial success of conveying passengers and merchandise by means of this comparatively untried system of transport. The town of Middlesbrough itself owes its birth to the same men who listened favourably to the assurances of a son of Tyneside—George Stephenson—in respect to the future of the locomotive engine. We have now the third generation of the family of Pease, and its members occupy a front rank among those engaged in work rendered possible by the establishment of railway communication.

. Cleveland has been chosen to illustrate the rapid growth of a district possessing unusual capabilities for producing an article in such general request as iron. In these respects this corner of Yorkshire can perhaps claim precedence over every other locality in the world. At the same time there are other parts of the kingdom which, as may be inferred from the lists of ironmaking centres given at page 203, have advanced to a position of great importance, second only to that of Cleveland.

Other districts than Cleveland.

As the first example, the hematite ore found in Cumberland and Lancashire may appropriately be taken. Unlike the ironstone of North Yorkshire, which occurs in a regular bed, extending over two or three hundred square miles, the ore of the two western counties just named occurs in detached veins and in deposits known as pockets, both being very irregular and uncertain in point of extent and capacity for yielding the mineral. Notwithstanding this, for many

years past the mines of Cumberland and Lancashire have produced considerable quantities of an ore containing 55 per cent. of iron, instead of 30 to 32, like that of Cleveland. In 1855, according to the Government returns, the output was 537,616 tons, but this was almost entirely smelted in furnaces at a distance, principally in South Wales and Staffordshire. The total make of pig iron during the year in question, produced at home, was only 16,000 tons. Railway communication with the east coast, soon after 1855, afforded an unlimited supply of fuel, which raised (in 1884) the weight of pig iron made to 1,561,000 tons, and the quantity of ore worked to 2,595,000 tons.

Within the period just named a large and well-built town has sprung up on a barren plain of sand, superior in many respects to the iron metropolis of the east coast. Like Middlesbrough, Barrow-in-Furness is governed by a municipal council and is represented in Parliament by its own member. For this position Barrow owes much to the great landowner of the district, the present Duke of Devonshire, who has been a patriotic promoter of the industries of the town and neighbourhood. The great iron and steel works of the place, in which the duke is largely interested, is one of the largest and most complete in the world. It embraces fourteen blast-furnaces, Bessemer converters, making above 6,000 tons per week of steel ingots, and contains a rail mill of unusual strength and capacity.

Scotland will always occupy a conspicuous and honourable place in any history of the progress of the iron trade. The annual make in this portion of the kingdom probably did not, at the beginning of the present century, exceed 10,000 tons. In the year 1800, David Mushet discovered the famous Black-band ironstone near Glasgow, which, however, was but sparingly smelted during the ensuing twenty-five or thirty years. In 1828 the total make of

Scotch pig iron did not exceed 30,000 tons. This was a memorable year for the iron industry of Scotland, for during it Neilson patented his discovery of the hot-blast, by means of which, and the extended use of Black-band, Scotland rose rapidly to the first rank as a producer of the cheapest-made pig iron in the world. In 1839 the output was nearly 200,000 tons, from which figure it steadily advanced until 1860, in which year it nearly touched 1,000,000 tons. Ten years afterwards the make almost reached 1,250,000 tons, a quantity which has never been exceeded. On the contrary, since 1870, the make has been on the decline, so that it stands now just at about the same point as it was in 1860. This change in the fortunes of the Scotch iron trade is partly due to the more cheaply wrought Black-band being exhausted, and partly to the great competition offered by the large extension in the make of Cleveland pig iron.

Wales, including Monmouthshire, has always occupied a somewhat peculiar position as an iron-producing locality. In its best days there was rarely raised above one-half the ore required for the pig iron produced in this part of the kingdom. The deficiency was made up chiefly by importations from Cumberland, Lancashire, and the Forest of Dean, assisted by the forge and mill scoria from the malleable iron works on the spot. The erection of malleable iron works in Cleveland, and particularly of rail mills, was speedily felt in Wales. In consequence, the native ironstone raised in 1865 was very little more than one-fourth of what it was in 1855, viz. 485,000 tons, instead of 1,665,520 tons. In the course of time, Bessemer steel began to be somewhat extensively introduced as a material for rail making, and this branch was gradually extended in the Principality. With this extension, the ore raised in Wales declined until it may now be regarded as an aban-

doned industry, for in 1884 the produce of the native mines was only 95,000 tons. Wales was thus early in the field as a manufacturer of steel rails. Competition, however, for the hematite ores of Cumberland and Lancashire was, as we have already seen, set up by the establishment of extensive smelting works in these two counties. Fortunately for Wales, a cheap supply of ore can now be obtained from foreign mines, chiefly from those near Bilbao in Spain. In 1870 the total quantity of this mineral imported into the United Kingdom was 208,000 tons; in 1882 this had increased to 3,282,000 tons, of which the South Wales works are the largest consumers.

For many years Staffordshire occupied a much more conspicuous place as an ironmaking centre than it does now, for it has gradually declined in importance during the last twenty years. This change has been caused by the great expansion of the iron trade in the North Riding of Yorkshire, Lincolnshire, and Northamptonshire, which two latter counties contain ironstone resembling, in cheapness of cost and in quality, that obtained in Cleveland. The numerous industries, however, which grouped themselves around and at Birmingham, Wolverhampton, and generally in what is known as the *Black Country*, have provided a considerable local outlet for the produce of the Staffordshire ironworks, which still preserves for the county a position of no small importance in our national iron trade.

Sheffield and its neighbourhood is classic ground in connection with the manufacture of steel. It owes this, not to any natural facilities for the manufacture of iron in its first stage of pig, but to the early settlement of steelmakers in the town and its vicinity. Having regard to the raw material—bar iron—being brought from Russia and Sweden, it may appear extraordinary to find so very

important an industry as that of steel settling itself nearly sixty miles from Hull, which is its natural seaport.

It is said that foreign iron was first used about three hundred years ago in Sheffield in the manufacture of steel. If so, it is very likely that British iron, made direct from the ore by means of charcoal, was employed before the Sheffield makers began to import foreign iron, brought in the first instance from Denmark and Spain. In either case the existence of woods capable of furnishing charcoal, coupled with an extraordinary abundance of water power for driving the tilt hammers, no doubt greatly influenced the choice of this town as a suitable site for the manufacture of steel. Besides these considerations, it must be remembered that the article itself, in its crudest forms, bore such a high price in the early history of the trade, that the cost of carrying the bar iron from the seaboard might be of comparative unimportance. This source of expense is now greatly curtailed in its amount by the construction of a canal and a railway, and in the meantime there has grown around Sheffield a crowd of works for working up the steel made in the vicinity into the numerous articles in common use. With these advantages, there seems no likelihood of Sheffield having to fear much competition in the manufacture of files, cutlery, springs, &c.

When it had been demonstrated that steel could be manufactured by a more simplified process than any hitherto in use, Sheffield was the natural place towards which the introduction of the newmethod, to be hereafter mentioned, should gravitate. Some time after its application, the product, from its high cost, was confined to objects for which steel alone had previously been employed. If occasionally it was used for rails instead of puddled iron, this only happened when the small quantity so required was exposed to extraordinary wear. Thus in 1870, when iron

rails were being sold at 7*l.* per ton, those of the new steel were charged 17*l.* 10*s.*, or 13*l.* 10*s.* above the price of the hematite pig from which they were made. Of course, at any such price, the Sheffield makers could afford to pay the carriage on the metal from Barrow or Whitehaven, and convert it into rails at a good profit. In six years—i.e. in 1876—the price had fallen to 3*l.* 12*s.* above that of pig, in which year the make of ingots was about 240,000 tons. From this quantity it steadily rose as the price was lowered, until the quantity of steel ingots has reached, in the United Kingdom alone, 1,750,000 tons per annum. To such perfection, indeed, has the new process and rolling machinery been carried, that steel rails have been sold at 72*s.* 6*d.*, or 32*s.* 6*d.* above the price of hematite pig.

Long before the trade arrived at this condition, unremunerative as it is even in the best situated works, Sheffield could no longer compete except for such rails as may be required at no great distance from that town. As an indication of this change in the character of the trade, Messrs. Cammell & Co., of Sheffield, have recently removed one of their steel rail mills to the neighbourhood of Maryport.

Three forms of iron, description of.

A casual reference has been made to the three forms of iron as it is known in commerce, viz. cast iron, steel, and wrought iron. In order to describe with sufficient clearness the improvements which have been introduced into the processes connected with its manufacture, a few of the properties and modes of producing these three forms will be briefly given.

Cast iron is the product obtained by smelting the ore in the blast-furnace. It is fusible at moderate temperatures and expands slightly at the moment it becomes solid, two properties which fit it admirably for being run into moulds. It is comparatively brittle when cold, presenting when

cooled and broken an open crystalline fracture. The metal owes these qualities chiefly to a small quantity of carbon absorbed from the fuel during the smelting process. Besides carbon, pig iron always contains silicon, generally phosphorus, and usually minute quantities of other substances.

Blast-furnaces.

The blast-furnace is supposed to date from the fifteenth century; by whom and where invented is not exactly known. There is, however, no doubt that it was the gradual development of a furnace, two or three feet high, in which wrought iron was produced direct from the ore. Long before this history commences, its dimensions had reached what was then considered a point of finality; hence its performance had, for some time, not been marked by any substantial improvement. It is true that in 1828 Neilson made known the fact that heating the blast to 600° F., by passing it through hot iron pipes before it entered the furnace, greatly reduced the quantity of fuel required to produce a given weight of pig iron.

It was maintained that at works in Scotland where, previously to the introduction of Neilson's system, eight tons of coal had to be consumed per ton of metal produced, the weight required after its application was reduced to two and a quarter tons or thereabouts. It is, however, now well known that the actual saving due to heating the air did not amount to one-third of what was claimed for it, the remainder being the result of other changes introduced at the same time. Into these, however, there is not space to enter here. So late as 1837 the value of this invention was far from being generally recognised, and a large proportion of the pig iron still continued to be made with cold air. This plan was gradually superseded by the hot-blast, by which the weekly production of the blast-furnaces rose from less than 100 tons to 150, and in some cases to 200 tons, with a consumption of something like two and three-quarter tons

of coal, previously coked—or, including that required for the blowing-engine and heating the air, say three and three-quarter tons.[1] At this figure it stood until the improvements introduced by the Middlesbrough smelters about the year 1863. These consisted in doubling, and in some instances in quadrupling, the size of the furnace and in raising the temperature of the blast from 600° to 1,000° F.

The function of the fuel in the blast-furnace has a two-fold character—partly calorific and partly chemical. By the action of the first, fusion of the metal and scoria is performed, and the ore is heated to fit the oxide of iron it contains for the chemical action required to reduce it to the metallic state. This increase of temperature in the ore and its deoxydation are effected by the hot gaseous matters as they rise through the upper zone of the furnace; but the reducing power they exercise is exhausted before complete combustion of the gas takes place. The gas, thus only partially burnt, ignites when it reaches the air, and was the cause of the blazing volume of flame which in former years marked the ironmaking districts of the country. This gas, still containing combustible matter, is now conducted to the boilers and hot-air stoves, by which an annual saving of about 6,000,000 tons of coal has been made on the pig iron produced in the United Kingdom alone.

By the increase in the temperature of the air, by utilising the waste gases and by increasing the size of the furnace, the produce was raised from 200 to 500 or 600 tons per week, and the consumption of coal, all included, was reduced from three and three-quarters to two tons of coal per ton of iron. More recently the air has in some cases been heated, in stoves of fire-brick, to 1,200° or 1,500°, but

[1] This was the quantity of fuel required to smelt such ore as that of the Cleveland district. In the case of richer ores, such as the Scotch Blackband, &c., the consumption was something less than the weight just named.

the economy of fuel by this additional temperature has been small compared with that effected by Neilson and, after him, by the Middlesbrough ironmasters. On the other hand, the weekly produce has been improved to the extent of 50 to 100 tons per week by the 200° to 500° in the heat of the blast, got in the manner just described. Where very rich ores are treated, as in the United States, as much as 60,000 tons a year, or even more than this quantity, has been run from one furnace, part of which extraordinary make is no doubt due to the use of this more highly heated air.[1]

The idea of utilising the combustible gas which escaped from the blast-furnace is of French origin, dating so far back as 1814. It was, however, only when George Parry in South Wales simplified its application, about 1850, that its use began to become general.

It may be remarked, in districts where the nature of the coal permits it to be used in the raw state, that the furnace gases contain traces of ammonia. A very bold attempt has been made at the Gartsherrie ironworks, near Glasgow, to pass the enormous volume of gaseous matter which escapes, through condensers, in order to intercept the ammoniacal vapour. With the results obtained the owners of this establishment express themselves satisfied. The subject is referred to in this place on account of the great value of certain compounds of ammonia for agricultural purposes.

A French invention, known as the Simon Carvés, has been applied in two cases in the county of Durham to coke ovens; the object being also to intercept the ammoniacal salts which are formed in the process of coking.

Steel occupying an intermediate position in point of

[1] Since writing the above, the author has been informed by his friend Mr. Andrew Carnegie, that the furnace F at the Edgar Thomson Steel-works, near Pittsburg U.S.A., made in four weeks 7,577 tons of 2,240 lbs.

Wrought iron.

the carbon it contains between cast and wrought iron, might, on that account, be next spoken of. In practice, however, it is found more convenient to rid the iron, as it exists in pig metal, of as much of its foreign ingredients as possible. Carbon disappears with the rest, and afterwards the exact quantity of this last-mentioned substance is restored so as to constitute steel. We shall, therefore, first say a few words on wrought iron, the process of producing it being, as may be inferred, a preliminary one to that of getting steel.

A passing allusion was made to an ancient mode of obtaining wrought iron direct from the ore in a low hearth, known as a Catalan fire. This plan had the recommendation of affording a purer iron than could be obtained by the blast-furnace, followed by the subsequent process known as that of puddling, and it further appeared to possess the additional advantage of simplicity. Many trials, in consequence, have been undertaken to reinstate a nearly obsolete practice, although it had been displaced very many years ago by the blast-furnace, when the latter was greatly inferior in point of efficiency to the furnaces of the present day. Eventually all these attempts have been abandoned, and the blast-furnace bids fair to remain for all time an indispensable implement in the manufacture of iron.

Cast iron, however valuable for being run into moulds, is useless where great strength and malleability are required. To obtain a material having these properties, it is necessary to expel those substances which have entered into combination with the metal during the smelting of the ore. At first this separation was carried out in a Lancashire fire, as it is called, similar in dimensions and form to that used for obtaining malleable iron direct from the ore. In it the pig iron was melted with charcoal or coke, the combustion being maintained by a current of compressed air. After

fusion the blast was continued, when, by its penetrating the molten iron, the carbon and most of the silicon and phosphorus were expelled, and the result was a spongy mass of wrought iron. The process is an expensive one in fuel, labour, and waste of metal, but the product obtained was one of such quality that it continues to be the method employed for making the highly esteemed bars imported into this country from Russia and Sweden.

Such was the method of obtaining wrought iron when Richard Cort, a native of England, invented the puddling-furnace. In it the pig iron is melted, after which the workman stirs up the liquid metal to expose it to the action of the fire and of the oxide of iron which is always present. As the carbon, &c., are removed, the malleable iron appears in the form of granules, which the puddler collects by means of his tools into four or five separate pieces known as puddled balls. Each of these weighs about one hundredweight, and, after being placed under a steam-hammer, it is rolled into a rough bar of different dimensions according to the purpose for which it is intended. Six charges or thereabouts constitute a day's work for two men, and the weight obtained is about 25 cwts., produced by the combustion of about the same quantity of coal. The puddling-furnace, afterwards somewhat modified by S. B. Rodgers, continued from the latter part of the last to the middle of the present century to be the instrument by which practically all the malleable iron in the world was eventually made. We shall soon see in these pages that this office is no longer exclusively performed by the furnace of Cort; indeed there are not wanting those who foretell that the time is approaching when it will disappear from our forges. Whatever the future may bring, let it not be forgotten that in the puddling-furnace we have had the means of producing malleable iron sufficiently good and

sufficiently cheap to have achieved those industrial triumphs which have been dependent on this metal for their success.

Before proceeding to say a few words on the nature of steel, the reader may be reminded of the welding power possessed by wrought iron, by virtue of which rare property two pieces, on being suitably heated, may be joined together. This union is so complete, when well done, that the point of junction is as strong as any other portion of the bar.

Steel.

If to the wrought iron obtained from pig iron in the manner described, a small portion of the carbon is restored, we have steel varying in hardness according to the extent of such restoration. Hardness and fusibility are promoted by additions to the carbon, softness and power of welding by its partial withdrawal. Steels of certain composition vary in the degree to which they are capable of receiving the valuable property of *temper*. By this is meant the power they possess of being hardened to different degrees by being heated to different temperatures and suddenly cooled. It is this faculty which enables cutlery and edged tools of steel to receive and retain their sharpness beyond that of any material with which we are acquainted. Steel also owes its great and enduring elasticity to its tempering, so that the hair-spring of a chronometer, by which its time-keeping is regulated, will make millions upon millions of oscillations without its powers of resilience being sensibly impaired.

In the matter of strength, cast iron is the weakest of all the forms of the metal; wrought iron is much stronger, but it is steel which is capable of bearing the heaviest load without fracture. The following figures represent the breaking weight in tons, when hung at one end, of a bar having a sectional area of one inch :.

Cast iron	Wrought iron	Steel
6 to 14 tons	20 to 30 tons	28 to 60 tons

The methods of making steel are so numerous that any reference to even some of the principal ones must be very brief.

A simple plan consisted in exposing the molten cast iron in a low fire under the same conditions as when wrought iron is made in the manner still pursued in Sweden and Russia. Such exposure was arrested when the carbon remaining was enough to constitute steel.

The principle of partial decarburisation has also been applied to the puddling-furnace, the product being known as puddled steel.

Cast and wrought iron were melted together in crucibles, in proportions calculated to give steel of any desired composition as regards carbon.

For producing an article of the highest class the process known as that of cementation is the one pursued. For this, pig iron made from the purest ores smelted with charcoal is converted into malleable iron in the Lancashire fire, charcoal also being the fuel employed. The product is carefully hammered, and the bars so obtained are exposed to a pretty high temperature for about ten days in fireclay chests filled with charcoal. At the end of that time the iron has absorbed the needful amount of carbon, and the steel thus made is fit for being welded or melted in crucibles to form cast steel. To effect this fusion as much as four tons of coke were required for one ton of steel, but the quantity of fuel now consumed has been much reduced by the use of the Siemens plan of burning gaseous fuel with heated air.

The cementation process is also applicable to irons of inferior quality to that referred to above.

In 1856 a paper was read before the British Association 'On the Manufacture of Iron and Steel without Fuel.' From this communication we learnt that it was possible to obtain

several tons of wrought iron in a state of perfect fusion, without the aid of any heat beyond that produced by the combustion of a portion of the pig iron from which it was made. The paper in question was contributed by Henry Bessemer, and the process it described was that now so well known in connection with his name. The difference between the process he described and any of those in previous use lay in the manner in which the air used was introduced into the liquid cast iron. Whenever it had been sought to remove the carbon, &c., from pig by means of compressed air, so as to obtain wrought iron or steel, the current was directed downwards into the melted metal. The bottom of the Bessemer converter, as it is called, is perforated by several openings, through which a very much larger volume of air was made to pass upwards through the iron than was possible when the blast was made to descend.

We have already seen how the old Lancashire fire used for obtaining wrought iron was displaced by the puddling furnace of Cort, in which, by the exhausting labour of two men, about 25 cwts. represented a day's work. For this, a weight of coal equal to that of the iron produced was consumed in the operation. A century later we return to the blast, which is made to perform the mechanical work of the puddler, but with such rapidity that ten or twelve tons of pig are converted in about fifteen minutes.

Elevation of temperature is a result of quick combustion, and this, in the Bessemer process, is so violent that we have several tons of molten wrought iron obtained without any fuel beyond that required for blowing the air through the liquid mass. It must not, however, be supposed that this result was achieved without many obstacles having been encountered. It was speedily discovered that only pig iron of the purest class, rarely met with in commerce, was capable of being treated successfully in a Bessemer converter.

This difficulty was surmounted by Mr. R. F. Mushet discovering that the addition of metallic manganese corrected the defects in iron and steel obtained from the less pure kinds of pig. But, even with this additional precaution, it was found that no metal containing above one part of phosphorus in one thousand was suitable for the new process.

Basic process.

It unfortunately happened that of the ores found in the United Kingdom a very small proportion only afforded a product sufficiently free from phosphorus for making steel. Thus the pig iron got from ironstone of the lias or from the coal formations often contains 1 to $1\frac{3}{4}$ per cent. of this element, and was, in consequence, quite unfitted for use in the Bessemer converter. By the joint efforts of several metallurgists [1] this evil has also been successfully dealt with, by what is now well known as the *Basic process*, in which the phosphorus is transferred during the act of conversion from the iron, by means of lime, to the slag which is formed.

Now phosphorus constitutes, as is well known, an indispensable element in animal as well as in vegetable organisms, hence the necessity of returning to the soil substances containing this element, to make good that which is withdrawn by the crops it grows.

We have in the liassic ironstone phosphorus assimilated during life by a low type of animal beings, at an early period of the history of our planet. Countless millions of these were buried in the torrents of ferruginous mud brought down to the sea, which served for their feeding-ground. The phosphorus they derived from its waters is now reappearing in the pig iron obtained from the sedimentary iron

[1] Mr. Thomas, who was associated with Mr. Gilchrist, Mr. Snelus, Mr. Windsor Richards, and Mr. Martin, received the Bessemer Gold Medal from the Iron and Steel Institute for the services they rendered to this important invention.

ore in which the remains of these prehistoric animals were embalmed. Here it has been a source of infinite trouble to our iron manufacturers, for which the basic process has provided a remedy. In addition, there is now a further prospect of relief by the promise that the phosphorus, instead of being a source of loss, will, in the slag to which it has been transferred in the basic process, be useful as a fertiliser of the soil.

The molten steel obtained from a Bessemer converter is poured into an iron mould, from which it is removed after being sufficiently solidified. While still red hot it is usually taken direct to a furnace, where it remains a short time, and is then rolled into a rail or other object for which it may be required. Indeed, for some articles, the heat evolved during the active combustion in the converter is sufficient to permit the steel being rolled into the finished bar direct from the ingot mould. Thus, instead of the repeated heating and cooling, involving use of coal and waste of iron, in the older method of conversion by puddling, the pig is brought in the molten state from the blast-furnace to the new converter. It is there blown into steel, and, with at most one reheating, we have the finished bar, greatly superior in strength and durability to the ordinary puddled iron.

Taking rails, for the purpose of comparing the economy of the two modes of manufacture, it may be assumed that the labour in the Bessemer process is very little more than one-fourth, and the coal consumed does not exceed one-fifth, of that required for the production of the ordinary wrought iron.

It is only right to observe that the economy effected by the Bessemer process itself has been largely assisted by improvements in the machinery devised in later years. Hot ingots weighing a ton each, and vessels containing ten tons or more of molten steel, are moved with ease and

expedition by hydraulic power, first practised by Sir W. G. Armstrong. It is, however, in the rolling-mill itself that the most marked changes have been effected. Mills are to be found consisting of three steam-engines placed one in front of the other, and capable, if required, of exerting a united force equal to that of 9,000 horses. An ingot, weighing 20 to 25 cwts. is run from the ingot-mould or from the heating-furnace, as the case may be, to the first pair of rollers. All the engines are on the 'reversing' principle devised by Mr. Ramsbottom. The mass of steel is taken hold of by the rollers, and after each pass the engine is moved in the opposite direction, so that the metal is drawn backwards and forwards until the rolling is completed. When the work at one set of rolls is finished, the elongated bar is received on a series of iron cylinders at the floor level, by which, when set in motion by steam, it is transferred with great rapidity to the succeeding mill. There the rolling is continued, and from it the now greatly extended steel is passed on to the last pair of rolls, from which it issues as a railway bar 130 feet in length, drawn out from an ingot 6 feet long in three and a half minutes. The rail is then cut into lengths of 30 feet by circular saws, to and from which it is moved by the aid of ingeniously constructed mechanical arrangements.

Such is the power and completeness of the rolling machinery now in use that there are instances of nearly 400 tons of rails having been turned out in twelve hours by one mill of the character just described.

Fifty years ago the largest iron boiler-plates which could be rolled measured 9 feet by 3 feet, and weighed 5 to 7 cwts. Now iron of this description is turned out 13 feet by 10 feet, weighing 15 to 18 cwts. Still more striking is the present power of producing armour-plates for protecting the sides of our war steamers. These are made as large

as the thin plates just mentioned, but, instead of about three-eighths of an inch, they measure 19 inches in thickness, and weigh when finished 43 tons. To manufacture such plates as these, furnaces to heat masses of metal, machinery to move them to the rolling-mill, and rolls to extend them have to be sufficiently powerful to deal with 54 tons, which is the weight of the rough block of iron or steel required to give a finished armour-plate of 43 tons.

In even such a brief description of the machinery used in our ironworks as that just given, it would be an oversight not to mention the well-known steam-hammer of James Nasmyth. They who have witnessed its action in forging a coil weighing 50 tons, used in modern ordnance, cannot fail to have been impressed with its immense power and ingenuity of construction.

There are to be found certain authorities who declare that the Bessemer process, wonderfully rapid as is its action, is now so completely under control that the product is almost, if not quite, equal in quality to the finest descriptions of cutlery steel. Against this assertion we have the fact that a larger quantity than ever of steel is produced at Sheffield by the old and more costly method of cementation, in which expensive malleable iron made exclusively by charcoal continues to be the material employed.

There are others who are equally confident that, for purposes where a material of a perfectly uniform quality is required, the less expeditious process known as the 'open hearth' must be employed. This operation is conducted in a reverberatory furnace devised by Messrs. Siemens Brothers, in which, by the combustion of heated gaseous fuel burnt with heated air, a temperature sufficiently intense to fuse malleable iron can be excited. The use of steel obtained in this way is growing in its extent. Thus in 1879 there were

produced 834,511 tons of Bessemer ingots against 175,000 tons made in the open hearth. In 1885 the quantities were 1,304,127 tons of the former, and 583,918 tons of the latter.

It may be mentioned that it is from steel made on the open-hearth principle that the bridge, having spans of 1,730 feet, for crossing the Firth of Forth is being constructed. It was, it is understood, chosen for the reasons given in the previous paragraph.

Prices of plates.

There is no doubt that the superior malleability of steel permits its being manipulated with greater ease than is the case with iron. A boiler-plate of steel can be readily rolled 35 feet long by 9 feet wide, whereas the chances are that most iron would often exhibit defects in any attempt to produce a plate of these dimensions. Nothing shows the relative facility of manipulation during manufacture of the two materials better than the prices at which they can be supplied. The best West Yorkshire plates of iron for locomotive boilers of the larger dimensions cost 25*l.* to 30*l.* per ton. Of steel even larger plates than can be made of iron are sold at present for 9*l.* per ton.

There is another circumstance, besides its greater strength, connected with the manufacture of steel, which for many purposes confers upon it a great advantage over iron made in the puddling-furnace. Practically every article we use of ordinary malleable iron has been built up out of a number of the small bars rolled from the puddled balls obtained in the manner already described. No doubt the welding property of the metal renders it possible to unite two pieces of it in the most perfect manner, but the interposition of oxide of iron, always formed when iron is heated, renders the welded mass very liable to give way at the points of union. This defect is particularly noticeable in the case of rails which are exposed to shocks of a very

violent character. From this objection steel is entirely exempt, because the ingot, run as it is from a perfectly liquid material, is entirely devoid of anything of the nature of a weld.

Limit of economy.

If anyone were to venture on the prediction that the manufacture of iron or steel had almost reached the ultimate limit of economy, he would incur the risk of being reminded that experience in other industries had often proved the rashness of such opinions. In the branch we are considering, the assertion perhaps rests on safer grounds than some former prophecies of this kind. Each item in every stage of the process, from smelting the ore to the finished bar, has been very carefully studied, and the actual quantity of heat involved in its accomplishment has been pretty accurately ascertained. In like manner the amount of heat capable of being excited by the combustion of the fuel is now well understood. This, with the knowledge it is believed we possess of the nature of the chemical action of the blast-furnace, enables us to calculate the possible margin for any further reduction in the quantity of coal consumed. From this information it has been computed that the margin is only a very small one—probably, at the outside, not exceeding 5 cwts., beginning with the ore and ending with the ton of finished steel. On the other hand, the large production of a Bessemer pit, and the great weight of work turned out by such a rail-mill as that described in these pages, have so reduced the cost of labour as to leave little room for much further economy.

Foreign labour.

It is often asserted that lower wages enables foreign countries, other conditions being equal, to produce iron and steel more cheaply than can be done in Great Britain. Any advantage in this direction enjoyed by other nations, for the reasons given in the previous paragraph, is greatly reduced in importance, and is more than met by the greater proximity

of our coal and ore, and by the greater convenience of export afforded by our insular position.

Distribution of iron.

Reference has been made in the present article to the quantity of pig iron produced in the United Kingdom and in the world at large. When we are told that the weight of the former is 8,250,000 and the latter 21,000,000 tons, few people realise the meaning of those large numbers. It may assist those who desire to form an idea of the dimensions of such masses of metal to be told that the iron made in Great Britain would form a cube of 351 feet on a side, while that of the world at large would be contained in one of 472½ feet. The latter would therefore be equal to a bar 12 inches square, having a length of 19,996 miles, or if run into a sheet one inch in thickness, it would cover an area of 45½ square miles.

An inquiry having for its object the knowledge of what becomes of all the iron which is made would be an interesting study. Unfortunately, the extent to which it can be carried, for the want of the necessary statistics, is very limited.

Firstly, as regards the consumption of iron among different nations, all that can be given under this head is the weight of new iron supplied. In addition to this, however, there are large quantities of old metal returned to the works for remanufacture. Leaving this out of the account, and dealing only with the new, we have at all events a standard which will serve us as a comparative test.

If we assume the population of Europe in 1884 to have been 348,180,000, the annual consumption, according to the journal of the British Iron Trade Association, was supposed to vary among different nations from 23 lbs. to 287·53 lbs. per head—the latter being that of the United Kingdom.

The 50,152,000 inhabitants of the United States required 270·92 lbs. per head.

The population of the British possessions, numbering 11,465,079 persons, exclusive of India, consumed 121·40 lbs. each, while the British-India territories, containing 31 per cent. of the inhabitants of the globe, only used 2·40 lbs. per head. The remainder of Asia, representing 517,161,000 people, managed to live with less than half a pound—i.e. ·49 lb. per annum.

South America and its islands, with 45,459,000 persons, used 13·5 lbs. per head; and Egypt, having 5,517,000 inhabitants, required 7·55 lbs. per individual.

The total population of the world—say, 1,424,680,000 persons—consumed, for the year we are considering (1884), 32·33 lbs. per head.

Consumption by railways.

When we turn our attention to the specific objects for which the iron consumed in the United Kingdom is required, we can only deal, and that often in only a very approximate fashion, with some of the larger sources of demand. The first of these is for railways, in respect to which it is not too much to say that but for iron this mode of transport would have been an impossibility. This opinion is based on the fact that we know of no other substance in nature sufficiently abundant and possessing the necessary properties wherewith a railway and its various appliances could have been constructed. It has been computed that, for the road itself as it exists at the present day in our own country, there has been worked up between 10,000,000 and 11,000,000 tons of pig iron, and for the locomotives, carriages, and waggons about 6,000,000 tons more, together 16,000,000 to 17,000,000 tons.

The violence of the shocks to which the materials forming the permanent way and rolling-stock of railways is exposed is such that the annual quantity of iron to be replaced is very considerable. To make good the loss of weight due to wear and that incurred in remanufacture on the railways of

the United Kingdom, probably about 300,000 tons of pig iron are annually consumed. The actual amount, however, has undergone and is undergoing very considerable modification owing to the extended use and greater durability of steel. As an example of the former, it may be mentioned that in 1873 there were made in Cleveland 325,000 tons of iron rails, and in 1879 only 7,000 tons. When it is remembered that the same change was going on elsewhere, and that 1,000,000 tons represents the annual rail-making capacity of Great Britain alone, the importance of this alteration in the nature of its iron trade will at once be understood. At present the manufacture of iron rails may be regarded as an obsolete industry, but there is every hope that the diminished demand for rails, arising from the greater endurance of steel, may be met by the wooden sleepers on which they are laid being replaced by metal.

Iron for ship-building.

Passing from conveyance on land to carriage on water, a ship may be likened to a long girder which must have strength to resist the violent strains to which the vessel is constantly exposed when in motion and frequently when in a state of rest. It is very long since any doubt could have been entertained that a ship might have been built of iron much better able to resist those strains than could be expected from a ship built of wood. Nevertheless, it was only a little before 1830 that William Fairbairn built a few iron canal-boats, and not till that year that he launched three small steamers for the coasting trade. The progress of this new industry, however, moved slowly, for it was 1836 or 1837 before he commenced the building of iron vessels as a regular business. Thirteen years after this, viz. in 1850, out of 132,800 tons of shipping built in that year, 120,000 tons continued to be constructed of wood. Soon after this period iron gradually grew in favour, so that in 1882 there was only about the same amount of wooden

tonnage constructed that there had been of iron in 1850. In consequence, however, of our extended commerce, assisted by our cheap iron, by the use of the screw-propeller, and by great improvements in our marine-engines, the shipowners of Great Britain have become carriers for almost the whole world. To such an extent has our mercantile fleet increased, that there were launched in the year 1883 no less than 1,116,555 tons of shipping, and the iron consumed in the hulls and machinery during the seven years ending 1884 was close on 4,000,000 tons.

Not only is an iron vessel much stronger than one of wood, but it is much lighter, and able, in consequence, within a given space, to carry a heavier cargo. Steel being still stronger than iron, a less weight is required, and a ship of the former has a still better carrying capacity than one of the latter. In consequence of this difference, and of the diminishing cost of steel, this material is growing in favour. Thus, in 1878 the steel tonnage built was only 4,470, in 1883 it had increased to 166,428 tons.

To compare wood and steel, Mr. James Laing, of Sunderland, has kindly furnished the writer with the weights of material used in building the hull of the 'Duncan Dunbar' in 1857. They were as follows:

	Tons
Iron knees, bolts, pillars, diagonal strappings, &c.	130
Copper sheathing	25
Timber of various kinds, finished weight	895
Weight when launched	1,050

The weight of a hull of steel of the same external dimensions as the above would be:

	Tons
Iron used, 45 tons; steel, 500 tons—total	545
Wood for decks, cabins, &c., tanks, cement, &c.	175
Weight when launched	720
Difference	330

As a result of this difference of weight, the steel vessel would carry 2,200 tons of deadweight against 1,870 tons capable of being conveyed on the wooden ship. Besides this advantage, the sides of the former ship are so much thinner than the other that it contains 4,000 cubic feet more internal space.

Iron for telegraphs &c.

The magnetised bar of steel in the mariner's compass, and the correct time-keeping insured by the elastic properties of the same metal in our chronometer springs, have rendered incalculable service to the science of navigation. By means of these two instruments, a tolerably accurate idea of the position of a ship can be obtained in the absence of all other means of observation. Out of Oersted's discovery of the deflection of the magnetic needle by a current of electricity has grown the electric telegraph. For it Mr. W. H. Preece, of the Post Office, estimates that the wires in use in the United Kingdom amount to 50,150 tons, and Mr. John Pender gives 400,000 tons as the weight of the 1,714,000 miles of overhead telegraphic wire of all nations. Roughly speaking, this gentleman considers there are in the 107,000 miles of submarine cable now in use 200,000 tons of iron. These undertakings represent a capital of 51,725,500*l.*, or, including the land service, no less a sum than nearly 90,000,000*l.* sterling.

Iron free from carbon is also susceptible of being magnetised so long as the exciting cause is present, but this property disappears the instant the source capable of exciting magnetism is withdrawn. It was this principle which was made use of in the telephone as originally constructed. A disc of soft iron, placed near a magnet, was caused to vibrate by the human voice, and the vibrations were transmitted to a second disc of iron by means of a conducting wire. These secondary vibrations produced sound-waves, and thus conveyed the voice of the operator at the one end of the wire

to him who was listening at the other. This ingenious invention has been greatly increased in power by supplementing the magnetic by an electric current when a suitable conductor is employed. The Telephone Exchanges of Liverpool and Manchester, and of Edinburgh and Glasgow, are in constant communication. Still more remarkable is the fact that a conversation has been successfully carried on between New York and Chicago, a distance of about 1,000 miles.

Wire ropes.

With the demand for wire for telegraphic purposes, its substitution for hempen ropes, its use for fences and other objects, it has been estimated that the weight of iron and steel converted into this form alone is not short of 500,000 tons a year.

Iron for pipes.

The extent to which gas has been employed for illumination, and the necessity of bringing water from long distances for the accommodation of large populations in our towns, have necessitated the extensive use of cast-iron pipes for the distribution of these two requirements of civilised life. To provide for them it has been calculated, upon the best data at our command, that in the United Kingdom as much as 500,000 tons of pig iron are consumed in its pipe foundries. Of this quantity one-half is required at home, and the remainder is exported over sea.

Tin plates.

The property possessed by iron to take and retain a coating of tin fits it admirably for purposes where strength combined with lightness and a certain amount of resistance to corrosion are desired. Hence the suitability for the so-called tinplates for many household purposes, for packing cases, and particularly for the conveyance of preserved meats, fruits, &c., now so largely imported into Europe from the United States. In 1885 the exports from the United Kingdom of tinplates, chiefly for America, was close on 300,000 tons, or nearly three times what it was

twelve or fifteen years ago. Before long we may expect the total make of tinplates in the world to reach 500,000 tons a year, which means sufficient to cover an area of nearly fifty square miles.

Iron of United Kingdom: disposal of.

It may be convenient now to close this necessarily imperfect account of the uses to which iron is put, by an approximate estimate of the purposes to which it is applied in the United Kingdom. Five years, ending with 1884, have been selected as being those of the largest makes.

Approximate Weight of Pig Iron to produce various Articles consumed in the United Kingdom (1 = 1000).

	1880	1881	1882	1883	1884
Construction of new railways . .	131	84	161	66	149
Renewals of old railways, loss in remanufacture	90	90	90	90	90
Additional rolling-stock, new . .	52	100	40	40	92
Renewals of old rolling-stock, loss in remanufacture. . . .	160	160	160	160	160
Total for railways . . .	433	434	451	356	491
Shipbuilding	390	579	763	860	611
Gas and water pipes, supposed .	250	250	250	250	250
Tinplates, supposed . . .	75	75	75	75	75
Architectural works — Machinery for home use, domestic purposes, for telegraphs, for fencing, &c. .	2,097	2,138	1,964	1,981	2,136
	3,245	3,476	3,503	3,522	3,563
Pig iron exported as such, or that required for rails, bars, &c., exported or consumed in Great Britain for machinery for exportation .	4,332	4,404	5,002	4,663	4,054
	7,577	7,880	8,505	8,185	7,617

Labour in connection with iron.

Little has purposely been said in the course of this sketch of the iron industry of the United Kingdom of a purely commercial character. Nevertheless enough has perhaps been advanced to satisfy the reader of its vast extent in this respect, and of its national importance in affording employment to great numbers of miners, smelters, and people engaged in converting the crude metal into

wrought iron or steel. Considered from the labour point of view in the ironworks themselves, we are standing only on the threshold of any estimate we may attempt to form of its real magnitude. This we only begin to realise when we approach the workshops in which the metal has to be converted into those articles which fit it for actual use.

In some rare instances, the amount of workmanship expended in the manner just referred to is very trifling. Annually there are consumed in the United Kingdom about 300,000 tons of railway-chairs, which are usually sold at about 55*s.* per ton when pig iron costs 40*s.*, leaving thus only 15*s.* for the expense of conversion.

Cast metal pipes are another large item in the industrial application of iron; but here, with pig at the price just named, the increase of value is about doubled—i.e. gas and water pipes are sold at something like 4*l.* per ton. Articles like stove-grates used in domestic fireplaces weigh but little, and receive little labour beyond that incurred in running the iron into moulds, and are sold at from three to four times the price of the metal employed. Kitchen-ranges are worth nearly five times the price of the iron entering into their construction.

For shipbuilding as much as 500,000 tons of wrought iron and steel have been used in one year. If we assume the value to be 2,500,000*l.*, the mere wages for constructing the hull will amount to something above one-half the cost of the metal used.

A vessel carrying about 2,000 tons is propelled by an engine and boilers weighing 165 tons. The value of the finished machinery placed in the vessel will probably be about ten times that of the raw materials as received from the ironworks.

Again, a locomotive engine and its tender costs in the

market about 60*l.* per ton, which is about nine times the value of the metal used in its construction.

A self-acting mule, containing 1,000 spindles, costs from 210*l.* to 250*l.*, and weighs about six tons. The iron used is of an expensive character, but we shall be within the mark in supposing the finished machine is sold for five times the cost of the materials used in building it.

Needles—familiar objects of domestic consumption—are made from steel wire, which is delivered to the manufacturers by the wire-drawers.

Messrs. Henry Millward & Sons, of Redditch, have enabled the author to give analogous figures for the staple trade of their town—namely, needles and fish-hooks.

Common needles, such as are exported to China, are made from Bessemer steel wire, costing the manufacturer about 60*l.* per ton, the steel billets from which this wire is produced being worth about 4*l.* to 5*l.* The finished article sells for 260*l.* The delicate instruments used for fine work are made from wire costing 2*s.* 6*d.* per lb., or more than the needle which suffices for the Chinese, while the needle for home use sells at 5,600*l.* per ton. In the manufacture of fish-hooks, the wire used for the production of the finest costs 336*l.* per ton, while the hooks themselves sell at the rate of 14,000*l.* to 15,000*l.* per ton.

Probably the most expensive form in which iron is sold is for the steel hair-springs in watches and timepieces. It is needless to say the consumption is very limited in its amount, for it would require nearly forty millions of the former to weigh one ton. The retail value of this quantity would be about 400,000*l.*, or above three times the price of gold. The main-springs of timekeepers are a coarse and inexpensive article compared with the more delicate instrument just named, for they only bring about 6,000*l.* per ton.

With all our agricultural implements of iron, with every

article of clothing produced in a large measure by machinery made of metal, with our means of artificial lighting, as well as the water we require brought to our dwellings in iron pipes, with our transport on land performed on roads of iron and on sea by ships of the same material, with wind and water as moving powers almost entirely displaced by the steam-engine, it may well be asked whether the inhabitants of the United Kingdom have not reached their maximum point of home consumption of the metal we are describing. The figures given in these pages, indeed, countenance the belief that any future extension of the demand for iron in this country will be chiefly that required by any increase that may take place in our population. On the other hand, foreign nations are constantly adding to their demands for a metal in constant requisition by peoples who are following our example in extending home industries. This want of iron was formerly, and continues to be, largely addressed to the ironmasters of Great Britain; but while the world's requirements have largely increased in late years, the quantity exported from this country, as may be seen in the table recently given, has declined. This arises from the greatly increased production in the United States, in France, and in Germany as compared with our own. Thus between 1870 and 1883 the make of pig iron in Great Britain rose from 5,963,000 to 8,529,000 tons, while that of all other nations, from 5,602,000 tons in the former year, became 12,534,000 tons in the latter. This means that while our increase was 43 per cent., that in other countries amounted to 223 per cent.

It is no secret that this greater activity in the foreign iron trade has been mainly promoted by the heavy duties directed against the importation of British iron. It is better that it should be so than that the decline of our export trade should arise from Nature having been less

lavish in her gifts to us than she has been elsewhere, or that we are less skilful in utilising our opportunities than our foreign competitors are in turning theirs to good account. As much as this, indeed, has been said upon some occasions in comparing the progress of the iron manufacture in Great Britain with that of other countries, but the record of the origin of the improvements contained in these pages gives no countenance to such an opinion.

When a branch of industry has reached the position claimed here for the iron trade, its votaries have no alternative but to turn to the lessons of science for inspiration. Mr. Huxley, one of our greatest living teachers, has recently warned us of the 'dangers of dropping astern for want of the education which is obtained elsewhere in the higher branches of industry and of commerce.' The captains who led the forces in the iron trade were formerly as open to criticism in this respect as those of any other company in the industrial army. It is, indeed, well within the recollection of the writer when, to use the learned professor's words, the ironmasters 'looked askance at Science.' The figurative 'flirtation' he speaks of between Science and Art already approaches to an 'intimacy,' which bids fair to ripen into a firm alliance. If so, then in any fresh departure from the old trodden ways we may hope to see our iron manufactures advancing side by side with those of any other nation.

LOWTHIAN BELL.

SCHOOLS.

I HAVE to speak of the progress of schools in England during the present reign, and I begin with elementary schools—schools for the great bulk of the people.

First grants for elementary schools.

The first grant of public money for these schools dates from 1833, four years before the accession of her Majesty. This grant was administered by the Treasury, and was not accompanied by the right of inspection. The first rudiments of an Education Department appear in 1839, the third year of her Majesty's reign. On the 13th of February in that year, Lord John Russell laid upon the table of the House of Commons a letter which he had addressed by her Majesty's command to Lord Lansdowne, the President of the Council. The letter began as follows:

'My Lord,—I have received her Majesty's command to make a communication to your lordship upon a subject of the greatest importance. Her Majesty has observed, with deep concern, the want of instruction which is still observable among the poorer classes of her subjects. All the inquiries which have been made show a deficiency in the general education of the people, which is not in accordance with the character of a civilised and Christian nation.'

The letter goes on to mention the want of qualified teachers, better methods of instruction, and adequate inspection of the schools; it then touches on the 'wide, or apparently wide, difference of opinion with respect to

religious instruction,' and on the difficulties which this difference creates, and concludes as follows:

'On this subject I need only say, that it is her Majesty's wish that the youth of this kingdom should be religiously brought up, and that the rights of conscience should be respected.'

In pursuance of this letter, a Committee of Council on Education was appointed on April 10, 1839, consisting of the Lord President and four other of the Queen's Ministers. The Committee took over from the Treasury the superintendence of the application of any sums voted by Parliament for the promotion of public education. But it established, as a condition of its grants, the right of inspection, and it appointed inspectors. It is the beginning, therefore, of our Department of Public Education.

Sir James Shuttleworth.

Sir James Kay-Shuttleworth was, in fact, its founder. He it was who did most to interest Ministers in the effort to be made for bringing State help to schools for the people, and who chiefly devised the plans of proceeding. Sir James Shuttleworth, as I shall throughout call him, although in 1839 he did not yet bear that name, has never had full justice done to him. This doctor of medicine (in 1839 he was Dr. Kay), who in his professional practice for some ten years observed closely the condition of the labouring population in great cities—Edinburgh, Dublin, Manchester—and who became convinced that for the barbarism which he found there the school was the natural and true cure, that this cure would conquer barbarism slowly but would conquer it in the end, was a most remarkable man. He was not a man of high cultivation, and he was not a good writer. I am told that he might easily have become a powerful speaker, and I can well believe it; but he was not in Parliament, and his work was not to be done on the platform. As an administrator, when he had become

Secretary to the Committee of Council on Education, he did not attract by person and manner; his temper was not smooth or genial, and he left on many persons the impression of a man managing and designing, if not an intriguer. But the faith in popular education which animated him was no intriguer's passion. It was heroic, it was a gift planted by nature, and truly and earnestly followed, cultivated, and obeyed. And he who had this clear vision of the road to be pursued, had a clear vision also of the means toward the end. By no other means than those adopted by him could a system of public education have been then introduced in this country. Moreover, in laying out popular education he showed in general an instinct wonderfully sound—he grasped the subject more thoroughly, made fewer mistakes, than any of his successors. He was, too, a religious man, though both Church and Dissent distrusted him. He sincerely desired to make religious instruction a power in schools; he believed as firmly as Butler, that of education what is called *information* is really the least part. Only, the problem how at present to supply an effectual religious instruction seemed to him simpler than it is. As to programmes of secular instruction, he had acquired full knowledge of what was done in the good schools established on the Continent, and he applied this knowledge judiciously. I have already said that he did not attract, that he had faults; that both the clergy and the sects disliked and distrusted him. The general public was indifferent; it needed a statesman to see his value. Statesmen like Lord Lansdowne and Lord John Russell appreciated him justly; they followed his suggestions, and founded by them the public education of the people of this country. When at last the system of that education comes to stand full and fairly formed, Shuttleworth will have a statue.

The Reformation did not in England, as in Scotland

and on the Continent, create a system of elementary schools. The endowed schools founded in the reign of Edward VI. and Elizabeth were ill adapted to meet the wants of the poor, and, being ill-managed and without any effective supervision, became more and more unserviceable as time went on. Even the catechetical instruction of the children of the poor, for which provision is made by the 79th Canon, had come in the eighteenth century to be much neglected. Towards the end of that century, however, a movement in religion awakened a new sense of responsibility, and Sunday-schools were founded. They were of invaluable service. Up to 1839 a large part of the population owed to these schools not only their religious instruction, but their power, whatever it was, to write and read. The promoters of the Sunday-school, having seized the fruitful idea that the school is an inseparable element of the organisation of a Christian congregation, were naturally led to give more extension to this idea, and to institute the day-school. In the early years of the present century the National Society and the British and Foreign School Society were founded, in order by association to obtain the means of better reaching the end in view. The National Society was to promote schools in connection with the Church of England, and in which the catechism and doctrines of that Church were taught; the British and Foreign School Society was to offer to all Protestant congregations a common school, where the Bible was read, but no catechism admitted.

Sunday-schools.

From that time forward until 1839 these great societies were the chief and almost the sole agents for improving popular education in this country. Probably even before they existed there were scattered over the country a certain number of good schools, created and maintained by the zeal of individuals. But certainly from the time when the two societies came to reinforce individual efforts, schools of high

Condition of the lower classes.

merit were brought into existence. I am sure that my memory does not deceive me as to the merit of certain National schools which I remember to have seen in my youth. They were thoroughly good schools, schools which would be called good even now. Later I have visited, as an inspector, British schools which did not avail themselves of the annual grants from Government, and had remained therefore British schools of the old-fashioned type; some of these, too, I found to be thoroughly good schools, with certain merits of their own which modern schools do not, I think, reproduce. But undoubtedly the monitorial system, which all these old schools had to employ, required almost a man of genius as head teacher to work it profitably. Moreover, the means at the disposal of the great societies and of individual promoters of education were wholly insufficient. Immense and formidable gaps in the supply of schools presented themselves; whole regions were in a state of ignorance and barbarism, and there was no power of reaching them. Riots and rick-burning in the agricultural districts, sedition and outrage in the manufacturing towns, compelled attention to the neglected condition of the people. Inquiry followed inquiry; the returns given were in many cases inaccurate and misleading, but enough of the truth became visible to prove the urgent need for some action on the part of the Government. I have myself heard from those who, before the Reform Bill, visited Lancashire to inquire into the state of the manufacturing population, that in the town of Oldham they found it a common practice for men to run races through the streets naked, and in another large town they found that less than one hundred, of all the children of school age there, were at school.

But no one has drawn so striking a picture as Sir James Shuttleworth himself of the parents and scholars with whom, in London, the agricultural counties, and the manufacturing

districts respectively, the schools, when the Government first took them in hand, had very frequently to deal. The picture of the London 'street Arab' is familiar, and I need not here repeat it. Of the parents in the pauperised rural counties of the South of England he says:

'They were in a state resembling helotry. They were largely dependent on the poor-rate. There were few or no schools. The population was ignorant and demoralised; it had the craft of the pauper, or of the pensioner on parochial doles, of the poacher and the squatter on the common.'

And he says of the children, even those who attend some school:

'The very early labour of the children on the farms, and the interference of successive harvest and seed-time, make school attendance so brief, and interrupt it by such long intervals, that the child's poor capacity for school-work and his learning are subject to constant drawbacks. Moreover, there is no help at home. His parents, though they may be skilful in farm work, are unlettered, and in all other respects ignorant.'

Most striking of all is the picture of the school-children of immigrant families feeding the manufacturing districts of the northern counties:

'A family enters a manufacturing village; the children are at various school ages, from seven to eleven. They probably have never lived but in a hovel; have never been in the street of a village or a town; are unacquainted with common usages of social life; perhaps never seen a book; are bewildered by the rapid motion of crowds, confused in an assemblage of school-children. They have to be taught to stand upright, to walk without a slouching gait, to sit without crouching like a sheep-dog. They have to learn some decency in their skin, hair, and dress. They are commonly either cowed or sullen, or wild, fierce, and

obstinate. They are probably classed with scholars some years younger than themselves. They have no habits of attention; the effort of abstraction required to connect a sound with a letter is at first impossible to them. Their parents are almost equally brutish. They have lived solitary lives in some wild region, where the husband has been a shepherd, or hind, or quarryman, or miner, or turfcutter, or has won a precarious livelihood as a carrier, driver of loaded lime ponies, or poacher. The pressing wants of a growing family have induced them to accept the offer of some agent from a mill. From personal experience of many years, I know that such children as these form a large portion of the scholars whom the schools of the cotton and woollen districts have to civilise and Christianise.'

Want of good teachers.

The half-time system in factories, and the rule that no child under eight shall be employed in them, date from about the same time as the formation of the Committee of Council on Education. Without them the school could have produced little effect on a population such as that which has just been described. But there was another hindrance to the work of the school which half-time Acts could not touch—a hindrance prevailing not in the manufacturing districts only, but all over England—the want of good teachers. There were no training-schools; almost the only teachers whom the Committee of Council found at its disposal in 1839 were 'either untrained men who, from some defect of body or health, had been driven from the rougher struggles of life and muscular toil; or self-taught Sunday-school teachers, trained for three or six months in some central model school'—such, for instance, as the British and Foreign School Society had established in the Borough Road.

The Treasury grant of 20,000*l.* a year, from 1833 to 1839, was distributed through the National Society and

the British and Foreign School Society, for the purpose of building schoolhouses, and for that purpose only. When the Committee of Council was formed, the grant, of the same amount as before, was meant to provide also a system of inspection for schools, and to provide, above all, a normal school for the training of teachers, with a model or practising school attached to it. The system of inspection was established, and has been in operation ever since. The projected normal school met with keen opposition from the bishops and clergy of the Church of England, and was abandoned. Students of different religious confessions were to have been combined in it, and the religious instruction was to have been of two kinds, general and special—the general instruction to embrace all the students, and to be given by the headmaster of the school; the special to be given by the clergy and ministers of religion, at hours set apart for the purpose, to members of their own confession. It was at once assumed that the Government proposed to extend this plan of combined religious instruction to all the elementary schools of the country. In the storm which the Church raised, the newly launched Committee of Council very nearly suffered shipwreck. It escaped, however, but it had to throw overboard its projected normal school. It continued to distribute its grants through the two great societies, as the Treasury had done; securing, however, that guarantee of inspection for which the Treasury had neither established the means nor formulated the demand.

Opposition to the proposed normal school.

The third regulation of the Committee of Council's Minutes, presented to Parliament in 1840, was as follows:

Government inspection.

'The right of inspection will be required by the Committee in all cases. Inspectors authorised by her Majesty will be appointed from time to time, to visit schools to be henceforth aided by public money; the inspectors will not interfere with the religious instruction or discipline or management

of the schools, it being their object to collect facts and information, and to report the result of their inspection to the Committee of Council on Education.'

Much apprehension was felt lest the interference of the new inspectors should be vexatious, and the instructions to them were judiciously drawn so as to allay these apprehensions. The inspectors were to be careful to explain to school-managers that the object of the Government was not to supersede them, but to co-operate with them; not to control them, but to afford them assistance; to assist them in efforts for school-improvement in which they might want aid. 'You are in no respect,' the inspectors were told, 'to interfere with the instruction, management, or discipline of the school, or press upon the managers any suggestions which they may be disinclined to receive.'

As a proof of the sincere desire to work harmoniously with the managers, the Government undertook to appoint different classes of inspectors. The authorities of the Church of England desired that the inspectors should examine into the religious instruction of schools, and report upon it. This was agreed to, and the Government undertook to appoint no inspector of Church of England schools in whom the archbishops had not confidence, and to retain no inspector from whom that confidence had been withdrawn. Moreover, the inspector's report on the discipline and instruction was to be in duplicate, one copy of it for the Committee of Council and one for the archbishop of the province. Only clergymen were appointed as inspectors of Church of England schools. The British and Foreign School Society preferred that the inspectors of their schools should not examine into the religious instruction given there. These schools were therefore inspected by laymen; but here, again, the Committee of Council undertook to communicate to the Society the name of any proposed inspector, and not

to press his appointment if he did not possess the Society's confidence.

A Minute of 1839 declared that, if a school in England applying for aid were not in connection with either the National Society or the British and Foreign School Society, the application would not be entertained, except under special circumstances. In the schools of the two societies there was religious instruction; and it was held that no school could be admitted to aid in which the Bible was not read. With this condition Wesleyan, Catholic, and Jewish schools could of course comply; and, as time went on, these schools were admitted to aid. Secular schools, which could not comply with this condition, were excluded.

The first training-school.

The opposition of the bishops had prevented the establishment of a State normal school, yet a normal school was indispensable. The indefatigable man who was founding our public education determined to start a normal school himself, and to show how such an institution worked. In conjunction with his friend Mr. Edward Carleton Tufnell, who not long ago closed a long life of public-spirited labour, he took at Battersea the manor-house by the Thames, which is now known as the oldest and most distinguished of Church of England training-schools. The name of Mr. Robert Eden, afterwards Lord Auckland, at that time vicar of Battersea, should be remembered as that of a helper in the good work. It was his cordial encouragement which drew to Battersea the founders of the training-school, and he placed his parochial schools at their disposal as practising schools for the students.

The design was at first merely to provide a supply of trained teachers for workhouse schools. In these schools the rudiments of the pupil-teacher system, a system which was found at work at this time in Holland, had already appeared. The emergence of the first English pupil-teacher

deserves record. A good school had been formed in the Gressenhall workhouse in Norfolk. The master of this school, an active and intelligent man, fell ill. Among his scholars was a forward lad called William Rush, who had risen rapidly to the top of the school. When the master suddenly fell ill, this boy of thirteen years old took, of his own accord, the charge of the school, carried forward the prescribed routine, not only of the schoolroom, but of the school garden and workshop as well, and with such success that the guardians were summoned to see. They authorised Rush to continue his work, and invited Sir James Shuttleworth, who as Dr. Kay was then employed in Norfolk to administer the new Poor Law, to visit the school. Dr. Kay came, and, having seen the boy's work, engaged him to remain as appointed assistant to the master, who soon recovered. Rush was afterwards moved to the School of Industry at Norwood, for the sake of the ampler teaching and training to be obtained there, and afterwards to Battersea. Meanwhile the hint had been taken, and promising boys engaged as apprentices in several workhouse schools.

Work began at Battersea in February 1840. The first pupils were brought there from Norwood—boys like Rush, who were thought likely to form a class of serviceable apprentices. In a year's time their number grew to twenty-four. Friends of the founders aided the new institution by sending to it boys in whom they were interested, and paying 20*l.* a year towards their support. But, besides the pupil-teachers, there was a smaller class of young men, sent in the same way by benevolent persons wishing to train them to be schoolmasters. The number in this class amounted at the end of the first year to nine.

Sir James Shuttleworth lived in the house, and superintended the whole working of the new institution. Two

departments were formed, for each of which a master was appointed. The life of the pupils was to be plain, and the work was to be both bodily and mental; how plain the life, and the work how severe, let the training-school students of to-day learn with awe:

'The whole school rose at half-past five. The household work occupied the pupil-teachers altogether, and the students partially, till a quarter to seven o'clock (there were no servants kept except a cook). At a quarter to seven they marched into the garden and worked till a quarter to eight, when they were summoned to prayers. They then marched to the tool-house, deposited their implements, washed, and assembled at prayers at eight o'clock. At half-past eight they breakfasted. From nine to twelve they were in school. They worked at the garden from twelve to one, when they dined. They resumed their labour in the garden at two, and returned to their classes at three, where they were engaged till five, when they worked another hour in the garden. At six they supped, and spent from seven till nine in their classes. At nine evening prayers were read, and immediately afterwards they retired to rest.'

The meals were 'frugal or even coarse; it was thought desirable that their diet should be as frugal as was consistent with constant activity of mind and some hours of steady and vigorous labour, and that it should not pamper the appetite by its quality or its variety.'

This severe regimen was found trying by several weakly pupils at first, but presently they were braced and invigorated by it. 'They rapidly gained strength; the most delicate soon lost all their ailments.'

Both in the management and in the instruction of the Battersea school was felt the influence of the normal and orphan schools of Switzerland, and of the admirable men—Pestalozzi, Fellenberg, Vehrli—who had worked in them.

Of these men or their methods Sir James Shuttleworth had made a close and careful study, with the happiest fruit for his own plans. To prepare him for laying out the instruction for the future teachers of popular schools, he could not have come under better influence than Pestalozzi's. A Pestalozzian he always remained.

He and Mr. Tufnell, with the aid of some subscriptions from friends of their scheme, had borne the expense of the training-school during its first year. But he had solicited permission from the Government to have the periodical examinations entrusted to the newly appointed inspectors of schools, and he had always hoped that when his normal school was started and doing work, the Government would, if not adopt it, at least aid it.

The expectation was not disappointed. The Committee of Council granted in 1842 the sum of 1,000*l.* towards the expenses of the Battersea Training School, and in the following year a further sum of 2,200*l.* to enlarge and improve the school premises. To this second grant was attached the condition that satisfactory arrangements should be made for the future support of the institution. Its founders had meanwhile made an important change in their plan. They had come to the conclusion that boys could not with advantage be trained in a normal school, had raised the age of admission, and proposed henceforth to train adult students only. But the school had grown until it required for its maintenance resources greater than those of its original founders. At the same time, they felt that their original design of training masters for workhouse schools only might with advantage give place to the wider design of supplying with teachers the elementary schools of the country. Accordingly, with the consent of the Government, they made over, at the end of 1843, the Battersea Normal School to the National Society, in whose hands

it has ever since remained. The founders of the school retired from its management.

But they had accomplished a great work. Their example had speedily been followed. The British and Foreign School Society established a normal school in connection with their model school in the Borough Road; the Church established others; and Great Britain, which at the date of the Battersea experiment did not possess a single normal school, could show eight normal schools four or five years after it.

Defects of elementary schools.

Meanwhile the reports of the inspectors drew attention to the defects of the elementary schools, although, the Parliamentary grant being then in aid of building only, they had no power to bring help towards the maintenance of schools and the improvement of their teaching. They gave advice and recommendations to managers which the managers had no means for following; the reports, however, made it manifest that progress was impossible unless something more was done. The number of school-houses had considerably increased since 1833, but they were in general ill-furnished, ill-warmed, ill-supplied with books and apparatus. Above all, the condition of the teacher was deplorable. 'He has often an income very little greater than that of an agricultural labourer, and very rarely equal to that of a moderately skilful mechanic. Even this income is to a great degree contingent on the weekly pittances paid from the earnings of his poor neighbours, and liable to be reduced by bad harvests, want of employment, strikes, sickness among the school-children, or his own ill-health.' He had monitors for his assistants; but 'the monitors usually employed are under twelve years of age, some of them as young as eight or nine, and they are in general very ignorant, rude, and unskilful.'

In 1843 the Government of Sir Robert Peel attempted

Religious difficulties.

to deal with the education of at least the manufacturing districts. Sir James Graham's famous education clauses in the Factories Act provided for the establishment and support of schools in those districts. The religious instruction was to be that of the Church of England, but the exemption of Dissenters' children from this instruction, at the parent's wish, was secured. Now came the turn of the Dissenters to stop the way, as the bishops had stopped it in 1839. A fierce agitation was raised against the preference to be given to the Church of England. Mr. Henry Dunn, the acute and accomplished secretary of the British and Foreign School Society, who took part with great energy in that agitation, told me himself that what he had seen of tempers and motives while prosecuting it had so shocked him that he had registered a vow never to be induced to take part in a religious agitation again. The Whig leaders of the Opposition behaved well. The clauses could have been carried, but the fire which had been kindled over them would have continued to rage around the schools which they were to establish. No friend of education could like such a prospect. The Government therefore withdrew the clauses, and as the bishops had triumphed in 1839, so the Dissenters triumphed in 1843.

Solely concerned for the school, perfectly incapable of sacrificing it to the interest of either Church or Dissent, Sir James Shuttleworth took note of the situation, and of the possibilities created by it. There were extreme men on both sides who could not be conciliated. There were Dissenters who argued that the school was a religious institution, that the State could not touch religion without profaning it, and that with the school, therefore, the State should have nothing to do. On the other side, the attitude of Archdeacon Denison and men like him is well known. I myself once received a letter from a clergyman, then

trustee of a school which I proposed to visit on account of a building grant made to it some years previously, who told me that he 'would never permit an emissary of Lord John Russell, or any other Turkish Bashaw, to enter the school.' But there were a great many worthy people on both sides who were concerned that the cause of popular education should suffer a check, perhaps a little ashamed that it might be said that the check was owing to their religious disputes. The great body of promoters of Church of England schools were in this case; so were the majority of the Wesleyans and of the supporters of the British and Foreign School Society.

The Parliamentary grant for school building and school inspecting had risen in 1846 to 100,000*l*. By the Minutes of that year the Government of Lord John Russell, who had now returned to office, took a great and decisive step in advance. It was determined, instead of striving to establish schools of a new kind, to try a system capable of adapting itself to schools of the kind already existing, so as to encourage voluntary contributions for their support, to stimulate the activity of their management, and to promote their efficiency by rendering it one of the conditions on which aid should be awarded.

Sir James Shuttleworth had now become Secretary to the Committee of Council on Education, and the Minutes of 1846 were his work. An arrangement for aiding existing schools must of necessity benefit Church schools principally, because these were by far the most numerous. The Dissenters had not forgotten their recent victory. In the session of 1847 the new Minutes were attacked with great acrimony. Macaulay made a celebrated and highly rhetorical speech in their favour. A most vigorous speech by Mr. Bright against them deserves preservation, as a specimen both of his powers as a speaker and of the temper of poli-

tical Dissent. Mr. Bright was very indignant at being asked 'to aggrandise a Church by whose act his forefathers had languished in prison.' But the author of the Minutes had judged the situation rightly, and they were carried by a majority of 325.

Pupil-teachers.

The points of weakness to which the Minutes of 1846 addressed themselves were the teachers and the monitors. As to the monitors, it had been observed that schoolmasters succeeded in making monitorial schools efficient exactly in proportion as they were enabled by local circumstances to retain the monitors beyond the age of thirteen, or were permitted by the trustees to pay them a small weekly stipend, giving them at the same time the advantage of some separate instruction. By the Minutes of 1846 boys and girls of thirteen could be engaged for five years as pupil-teachers, with a stipend from the Government rising from 10*l.* a year to 20*l.*, and with daily separate instruction from the master and mistress, an instruction to which the Government attached a gratuity.

The training-schools were suffering because the supply of candidates for admission was poor in quality and insufficient in quantity. In the pupil-teachers they would have a natural supply of better prepared candidates. To enable the pupil-teacher to enter them, the Minutes of 1846 offered scholarships of 25*l.*, to be supplemented by a further payment of 20*l.* at the end of the first year's residence in the training-school if a certificate examination were then passed successfully, 25*l.* at the end of the second year, and 30*l.* at the end of the third, on the same condition. Four-fifths of the expense of the student's first year at the training-school would thus, it was calculated, be defrayed by the Government, and one-half of his expense in the years following. Here was help indeed to the struggling training-schools.

Not only had monitors been inefficient and normal schools suffering, but the salaries of schoolmasters and schoolmistresses had been in general miserably low. The Minutes of 1846 offered to students who, after passing the certificate examination, became teachers, a grant in augmentation of their salary varying from 15*l.* to 30*l.* a year, according to their degree of merit in the examination. But this augmentation grant was accompanied by the conditions that the managers should provide its recipient with a house rent-free, and with a further salary equal to twice the amount of the grant. Thus not only did the Government in itself better the teacher's position, it obliged the managers also, on their part, to better it.

These provisions were such as to secure a supply of better-instructed and better-paid teachers in the future. Meanwhile, however, the actual teachers would have been unaffected by them. But it was added, as an incentive to actual teachers to improve their qualifications, that untrained teachers might be admitted to an examination for certificates corresponding with those granted in the normal schools, and that the augmentation grant annexed to such certificates would be extended to these teachers also.

We have thus in the Minutes of 1846 a source of improvement of monitors, normal schools, and teachers. The Minutes likewise improved the fittings and material of the elementary school by stipulating that a school which received grants should be well furnished and well supplied with books and apparatus.

There were other provisions in the Minutes of 1846, provisions for very real needs of any complete system of popular education—for pensioning teachers, for establishing school gardens, school workshops, school kitchens, and laundries—which either failed of realisation or were realised but imperfectly. The provisions for the institution

of pupil-teachers, for the support of training-schools, for the augmentation of teachers' salaries, were realised fully; and the good done by them, and which to this day continues to operate, cannot be exaggerated.

Everybody can understand the utility of supporting training-schools and of bettering the position of teachers. The system of pupil-teacher apprenticeship has now many adversaries. Yet the institution of this system was undoubtedly the grand and chief merit of the Minutes of 1846. It provided a class of efficient schoolmasters and schoolmistresses more quickly than they could have been provided in any other way; it interested the population in the schools, it caused the teacher's profession to be generally regarded as a promising one, instead of as a refuge for the poor, the halt, and the maimed. I will add that the English schoolmaster has proved himself to have a remarkable aptitude for managing boy helpers, and not by any means an equal aptitude for managing adult helpers. Of course the introduction of the adult assistant was a necessity which soon made itself felt, and the pupil-teachers, moreover, were too numerous, were chosen at an age when their vocation could not clearly be discerned, and were not weeded, as they ought to have been, when after two or three years a youth's want of vocation became apparent. Had Sir James Shuttleworth not been forced by the failure of his health to leave the Education Department before the Minutes of 1846 had been five years in operation, he would, I am convinced, have seen the danger in his pupil-teacher system and have provided against it. As it was, all the pupil-teachers, bad and good, once caught in the scholastic net, were as a rule kept there, and drawn to land finally in the training-school; many issued from it unserviceable teachers, who had been unserviceable apprentices long before they entered it. But the abolition of the system would be a real misfortune. In

point of fact, in spite of the attacks upon it, it is extending; what is to be desired is that it should be maintained for those who prove to have a genuine vocation, and that others should after a time be strictly eliminated.

Sir James Shuttleworth's work in 1846 was a truly statesmanlike one; he did all that was possible at the time. This, however, is in itself no great achievement; but what he did was not only possible to be done at the time, it was likewise destined to grow and to bear much fruit in the future. Throughout the country, moderate Churchmen and moderate Dissenters were, in general, favourable to the new work; the working population, for whose especial benefit the improved schools would act, began to feel interest in them. But the grant grew. It had begun at 20,000*l.* in 1833; in 1846 it had grown to 100,000*l.* The Minutes of that year caused it to swell much more. Opponents predicted with horror that it would rise to a million and a half. Three years after the Minutes appeared there were 681 certificated teachers, and 3,580 pupil-teachers; ten years later, in 1859, the number of certificated teachers had risen to 6,878, of pupil-teachers to 15,224.

The Duke of Newcastle's Commission.

The appointment of the Commission 'to inquire into the present state of popular education in England,' commonly known as the Duke of Newcastle's Commission, was due to the apprehensions caused by the rapid growth of the Parliamentary grant. The Commission reported in 1861. By a large majority, the Commissioners decided on recommending the continuance of public aid on an unreduced scale to both normal and elementary schools. They enounced the opinion, however, that the actual system of grants was too complicated and that it threatened to become unmanageable by the central office, and they proposed to transfer to the local rates a considerable part of the charge. The grant then stood at about three-quarters of a million. The Com-

missioners proposed to lay on the county rates a charge calculated at 428,000*l.* a year for the present. Moreover, they had convinced themselves that insufficient attention was paid to junior classes in elementary schools; that the teachers were tempted to be too ambitious, and to concentrate their attention on a showy upper class, while the bulk of the scholars were comparatively neglected and failed to acquire instruction in 'the most necessary part of what they came to learn,' reading, writing, and arithmetic, in which only one-fourth of the school-children, it was alleged, attained any tolerable knowledge. But the Commissioners thought that, even under the present conditions of age and attendance, it would be possible, if the teachers had a strong motive to make them bring the thing about, for at least three-fifths of the children on the books of the schools—the three-fifths who were shown to attend one hundred days and upwards—'to read and write without conscious difficulty, and to perform such arithmetical operations as occur in the common business of life.' To supply the teachers with the requisite motive, therefore, the grant from the county rates was to take the form of a capitation grant, dependent on the number of scholars who could pass an examination in reading, writing, and arithmetic.

The Revised Code.

The Vice-President of the Education Department in 1861 was Lord Sherbrooke, then Mr. Lowe, an acute and brilliant man to whom pretentiousness with unsoundness was very distasteful and contemptible. The permanent secretary was one of the best and most faithful of public servants, the present Lord Lingen, who saw with apprehension the growth of school grants with the complication attending them, and was also inclined to doubt whether Government had not sufficiently done its work, and the schools might not now be trusted to go alone. These powerful officials seized upon the statements and proposals of the

Commissioners, and produced, as a consequence of them, the Revised Code. But they went far beyond the Commissioners. The training-schools were to lose their lecturers' salaries, the stipends of pupil-teachers and the augmentation grants of masters and mistresses were to be discontinued; everything was to be capitation grant, dependent on the ability of the individual scholars to pass an examination in reading, writing, and arithmetic, an examination for which they were to be arranged in four groups according to their age. The system of bounties and protection, said Mr. Lowe, had been tried and had failed; now another system should be tried, a system under which he would promise that popular education, if not efficient, should at least be cheap, and if not cheap, should be efficient.

There was a great outcry. It was said that, if the Government grant had increased, so had voluntary contributions; the one-third of the cost of popular education which the State contributed had called forth two-thirds from local and private sources to meet it, and this resource it was now proposed to discourage and endanger. The improved schools had been but a dozen years at work; they had had to civilise the children as well as to instruct them; reading, writing, and ciphering were not the whole of education; people who were so impatient because so many of the children failed to read, write, and cipher correctly did not know what the children were when they came to school, or what were the conditions of the problem which their educators had to solve. Sir James Shuttleworth maintained that, so far from its being true that all the children who had been at school for one hundred days and upwards in the year preceding the examination ought to be able to pass in reading, writing, and arithmetic, only those of them who had attended more than two years were fit subjects for the examination proposed.

The impossibility of preparing the bulk of the children to pass the examination proposed was no doubt exaggerated. We have seen what can be accomplished in this line by preparers. On the other hand, I have always thought that the Commissioners, finding in the state of the junior classes and of the elementary matters of instruction a point easy to be made and strikingly effective, naturally made it with some excess of energy and pressed it too hard. I knew the English schools well in this period between 1850 and 1860, and at the end of it I was enabled to compare them with schools abroad. Some preventible neglect of the junior classes, some preventible shortcoming in the elementary instruction, there was; but not nearly so much as was imagined. What there was would have been sufficiently met by a capitation grant on individual examination, not for the whole school, but for the children between seven or eight years old and nine or ten, a grant which would then have been subsidiary, not principal. General 'payment by results' has been a remedy worse than the disease which it was meant to cure.

The opposition to Mr. Lowe's Revised Code of 1862 so far prevailed that it was agreed to pay one-third of the Government grant on attendance, and but two-thirds on examination. Moreover, the grouping by age was abandoned, and the arrangement of the children in six classes, or standards, as they have come to be called, was substituted for it. The teacher presented the child in the standard for which he thought him fit; he must present him the next time, however, in a standard above that.

Defects of the Revised Code.

The capitation grant on attendance was four shillings; that on examination was twice that amount, one-third of which was forfeited for a failure in reading or writing or arithmetic. This latter grant has governed the instruction and inspection of our elementary schools ever since. I have

never wavered in the opinion—most unacceptable to my official chiefs—that such a consequence of the Revised Code was inevitable, and also harmful. To a clever Minister and an austere Secretary, to the House of Commons and the newspapers, the scheme of 'payment by results,' and those results reading, writing, and arithmetic, 'the most necessary part of what children come to school to learn'—a scheme which should make public education 'if not efficient, cheap, and if not cheap, efficient'—was, of course, attractive. It was intelligible, plausible, likely to be carried, likely to be maintainable after it had been carried. That, by concentrating the teacher's attention upon enabling his scholars to pass in the three elementary matters, it must injure the teaching, narrow it, and make it mechanical, was an educator's objection easily brushed aside by our public men. It was urged by Sir James Shuttleworth, but this was attributed to a parent's partiality for the Minutes of 1846 and the Old Code founded on them—a code which the Revised Code had superseded. But the objection did really occur to him and weigh with him, because he was a born educator, and had seen and studied the work of the great Swiss educators, Pestalozzi, Fellenberg, Vehrli. It occurred to me because I had seen the foreign schools. No serious and well-informed student of education, judging freely and without bias, will approve the Revised Code. In other countries no such plan is followed. It is said that the State must have the security of such a plan, when State aid to schools rises so high as it has risen in England; but in France, where the State is taking upon itself almost the whole charge for the popular schools, no such plan is adopted or contemplated. That is because the serious and well-informed opinion of educators has more influence on school regulation abroad than it has in England. In England it has little or none. The uneasiness and resistance of the teachers, hampered by a false system,

will at last perhaps give the 'purchase' for upsetting the Revised Code which the opinion of educators is too weak here to supply. Meanwhile our schools, with many merits, are undeniably less intelligent than those of the Continent; and this their inferiority is due in great part, although not entirely, to the Revised Code.

Mr. Forster's Elementary Education Bill.

A far more real fault of the system on which the Duke of Newcastle's Commission reported than its alleged neglect of the junior classes was its failure to meet more than partially the needs of the country. It reached not more than half of the children requiring education. The Revised Code did nothing to make good the old system's deficiencies in this respect. It dropped the proposal of the Newcastle Commission to throw on the rates a part of the public charge for schools, and kept the whole of it on the Consolidated Fund. During the eight years which followed the revision of the Code, several attempts were made to introduce a general system with support from the rates, but without success. At last, in February 1870, Mr. Forster produced his Elementary Education Bill. He proposed no interference with the existing aided schools. But he asked for powers to ascertain what in each locality was the supply of efficient elementary schools in proportion to the wants of the population, and, where the supply was deficient, to require the borough or parish where this was the case to make good the deficiency. The new schools needed were to be provided out of the rates, and a school board was to exercise the functions which in voluntary schools appertain to their promoters and managers. Mr. Forster at first intended that the town councils and vestries should nominate the school boards, and that these should have the power both of aiding existing schools and of appointing at their discretion, subject to a conscience clause, the religious instruction in the new Board schools. Compulsory attendance,

to which Mr. Forster had until lately been opposed, the school boards were to have the power of establishing by by-laws, if they thought fit.

The speech of Mr. Forster in introducing his measure, and the measure itself, made a most favourable impression, and at first all seemed going smoothly. Presently a storm sprang up. Dissenters and secularists seized upon the provisions enabling school boards to aid existing schools and to admit in Board schools what religious instruction they might think proper. Undoubtedly these provisions would in many cases have led to the establishment and support of Church of England schools out of the rates. To many this seemed intolerable; and, in resisting a provision favourable to the Church of England, the further question was raised whether in schools supported by public money there ought to be any religious instruction at all.

The country would not at that time have accepted—I doubt whether it would accept now—a system of secular public schools. As to the special religious instruction of Church of England schools, it is not, in my opinion, their best and most attractive feature. I prefer, it is true, the management and personal influences of a good Church school to those of a good Board school. In secular instruction I think the two kinds of school are about equal; but I have always thought that the Biblical instruction which the school boards have adopted, with some improvement, from the old British schools, was the religious instruction fittest on the whole to meet the desires of the population of this country and to do them good. To promote, in preference to such an instruction, the teaching of the catechism and special doctrines of the Church of England in elementary schools, was certainly not Mr. Forster's desire. But he was a man with a feeling heart and great fairness of mind; he was deeply sensible of the labours and sacrifices of the clergy

for popular education, and if the localities chose to mark their sense of these by establishing Church schools, he would have permitted them.

Credit due to the clergy.

In truth, if there is a class in English society whose record in regard to popular education is honourable, it is the clergy. Every inquiry has brought this out. I will give only one illustration, but it is an illustration indeed. The Newcastle Commission investigated the sources from which a sum of 4,518*l.* raised for schools in a particular district was derived. It appeared that the main contributors were the landowners and the clergy; the contributions from other sources were trifling. The landowners contributed 5*l.* 6*s.* per head, their rental from the district being estimated at 650,000*l.* a year. The clergy contributed ten guineas per head. The Newcastle Commission, with facts like this before it, did full justice to the clergy. 'The landowners as a class,' the report of the Commission adds, 'especially those who are non-resident (though there are many honourable exceptions), do not do their duty in the support of popular education; and they allow others, who are far less able to afford it, to bear the burden of their neglect.'

The clergy, therefore, well deserved consideration from Mr. Forster, and perhaps the best arrangement would have been one by which Church schools should have been aidable by rate, but a larger and simpler religious instruction given in them than at present. To admit a solution of this kind neither the clergy nor their adversaries had then moderation enough. The battle raged fiercely over Mr. Forster's Bill; he showed admirable skill and patience, and without them would never have saved it. He admitted several changes. The aid from the Parliamentary grant to voluntary schools was continued, but these schools had to submit to what is called 'a time-table conscience clause,' assigning the religious instruction to the beginning or the

end of the school-time, and enabling the school-children to be withdrawn both from that and from the Sunday-school. In the new schools to be aided from the rates religious instruction might be given, but with the same 'time-table conscience clause' in force; and in the religious instruction of these schools no religious catechism or distinctive formularies were to be used. The school boards were not to be nominated by the town councils and vestries, but elected by the ratepayers. These changes in Mr. Forster's original plan are none of them to be regretted; the great object of his Bill, to provide means for supplying the whole country with efficient schools, and for filling them, was attained.

Mr. Forster too, like Sir James Shuttleworth, deserves the praise of having discerned and done what was possible to be done at the time, and what would grow and bear much fruit in the future. For the extension of our popular instruction, he was able to do much more than Sir James Shuttleworth. He made this instruction for the first time national. He had also a high estimate of the teacher's calling, was the sincere well-wisher and friend of the teachers; they have gratefully recognised him as such, and he fully deserves their gratitude. But Mr. Forster was not, like Sir James Shuttleworth, a born educator, an earnest student of methods and problems of education; neither was he a Minister like Guizot or Wilhelm von Humboldt, with a philosophical mind trained and interested to weigh all questions of teaching, and well fitted to judge and decide them. The false direction given by the Revised Code to teaching, Mr. Forster did not correct; 'payment by results' he left as he found it. I doubt whether he even took its faults and fallacies into his mind at all. Other and great work for popular education, however, he found to do, and he did it with his might.

Hitherto throughout this sketch I have designedly been

very sparing of figures; but now, in order to show what has been accomplished since Mr. Forster carried his Education Act in 1870, to figures I must have recourse. The Newcastle Commission reported that in 1860 the annual public grants promoted the education of about 920,000 children, while they left unaffected the education of 1,250,000 others of the same class. The public grant was at that time about 750,000*l.*, and, to meet this sum voted by Parliament, there were raised by voluntary contributions and school-fees 1,250,000*l.*

In 1870, when Mr. Forster's Act was passed, there were in average attendance in day-schools aided by public grants 1,152,389 children. Fifteen years later, in 1885, there were in average attendance 3,371,325. There were 12,467 certificated teachers in 1870; in 1885 there were 40,706.

It is calculated that 20 per cent. of the population are children of a class and age to require elementary schools. The public schools in 1870 were sufficient for only 8·75 of the population; in 1885 they were sufficient for 18·18 per cent.

But the annual Government grants, which in 1860 were about 750,000*l.*, and of which the imagined possible rise to 1,500,000*l.* caused dismay, had risen in 1885 to nearly 3,000,000*l.* Rates, which are but another form of public aid, produced 1,140,964*l.* Voluntary contributions and school-pence produced over 2,500,000*l.* We have a total expenditure, in 1885, on public elementary schools, of more than 6,500,000*l.*, of which more than 4,000,000*l.* are from Parliamentary grants and from rates.

The proportion of public to private aid has indeed wonderfully changed since the Newcastle Commission reported in 1861. It was then estimated that, of the expenditure for the support of public elementary schools, one-third

was supplied by the Parliamentary grant and the remaining two-thirds came from voluntary contributions and school-fees. Sir James Shuttleworth thought that he saw his way to the establishment of a constantly increasing proportion of private support, a constantly diminishing proportion of public. 'The force,' he said, 'which will ultimately transform the whole, will be the result of education itself. When the people know that they have even more interest in the education of their children than their rulers themselves have, they will more and more take charge of it. They now bear two-thirds of the burden; but that third which they do not pay has given value to what before was of little worth, and has thus created a transient power destined to pass from the Government into the hands of those who will take the charge. The transference of administrative power to the local managers and the parents, will attend the gradual assumption by them of the payment of pupil-teachers and of the whole of the stipends of the certificated teachers, consequent on the effects of education on some generations of parents and on the middle classes.' But all calculations were changed by the nation's resolve in 1870 to provide at once efficient popular schools for the whole country. It is remarkable, not that the amount of private support from fees and subscriptions should not now be larger than it is, but that with rates and a national system it should still be so large.

Although 20 per cent. of the population are supposed to be subjects for the elementary school, there were in average attendance there, in 1885, only 12·26 per cent. The attendance will become better than this; but this, compared with the attendance in 1870 (but 5·5 per cent. of the population), and compared with what is found elsewhere, affords plenty of cause for satisfaction. The number of juvenile criminals, moreover, has diminished and is

diminishing; it is impossible not to connect this diminution with the growth of schooling.

There had been established in England and Wales, up to the beginning of April in last year, 2,203 school boards. The powers of school boards to enforce attendance were given by the original Act. Extensions of that Act have provided for the appointment of a school attendance committee for every borough and parish in which a school board has not been elected.

'Payment by results.'

Ever since the establishment of the Revised Code in 1862, attempts have been made to palliate the evil effects of 'payment by results,' of concentrating the teacher's efforts upon the securing of the greatest possible number of passes in the three elementary matters. By no Vice-President have such attempts been so zealously prosecuted as by Mr. Mundella. Of the Government grant, a considerably larger proportion than formerly now depends upon the average attendance; plans have been devised for obtaining more uniformity in the inspectors' judgments of 'results;' grant-earning matters other than the three elementary matters have been multiplied, and more latitude in the choice of them given to the school-managers. By the 'merit-grant,' the encouragement of results more general than those which are measured by the other grants has been attempted. Unfortunately, the whole system is vicious, and the truly useful Minister will be he who, instead of patching it, clears it away. To support your popular schools by appraising so many matters at so much each, then setting your inspectors to appraise the amounts earned by the children's performance, adding the totals and paying to the school the sum given, is fatal to instruction, fatal (though that is a much smaller matter) to inspection. It is a plan prohibitive of a good programme of study, and productive of mechanical teaching. A boy who leaves a town school

in Germany has in his school course been taught eleven or twelve matters, whereas an English boy leaving a like school has been taught but six or seven; and all the German boy's matters of study, except perhaps handwriting, have in general been better taught than the English boy's. Ours is a plan, I repeat, which no serious educator would entertain, and it has been entertained here because we have no provision whatever for bringing the influence of serious educators to bear permanently upon our school legislation.

Necessity of technical schools.

Mr. Mundella, however, has shown by his utterances respecting technical and secondary instruction that his thoughts are moving on the line which alone will conduct us to fruitful reforms. Technical schools are needed, and in elementary schools manual training should be given; yet it is undesirable to bestow in the elementary school too much prominence on this training, to turn the elementary school itself too much into a technical school. The technical school is, in fact, a secondary school, to follow the elementary school, after some manual training has there been acquired. But our secondary instruction is a chaos; unless, therefore, we organise the technical school within the sphere of our primary instruction, which is not desirable, we have no means of organising at all. Mr. Mundella sees the difficulty; he sees that there are problems of instruction for primary schools which we can only solve by having public secondary schools. There are problems of expense also. The school-rate for London was in 1885 over eightpence in the pound, for the whole of England and Wales over sixpence-halfpenny. Mr. Forster, in introducing his Bill in 1870, estimated that the rate could not exceed threepence. The cost for each Board school child in London was, in 1885, 3*l.* 7*s.* 10¾*d.*; in England as a whole, 2*l.* 6*s.* 2¼*d.* This is a very heavy rate of charge. If necessary, it must be continued; but the question is, How far is it necessary?

We shall never know, so long as our elementary education stands as at present isolated, our one service of public schools. Then only can the expense of our primary schools be rightly adjusted, when an organic connection between all our schools, primary, intermediate, and higher, supplies us with a scale of proportion for expense, as well as with a graded series of means for teaching.

Secondary Schools.

Defective secondary education.

The first year of her Majesty's reign found English elementary education a chaos; the fiftieth finds it, with whatever imperfections of detail, at any rate a national system. But English secondary education, likewise a chaos when her Majesty's reign began, remains a chaos still.

I have said so much on this subject that I prefer now to let any one rather than myself speak of it. The invaluable report of the Schools Inquiry Commission of 1865 sums up thus the state of secondary schools in England:

'There is no public inspector to investigate the educational condition of a school by examination of the scholars, no public board to give advice on educational difficulties, no public rewards given directly to promote educational progress except those distributed by the Science and Art Department, hardly a single mastership in the gift of the Crown, not a single payment from the central government to the support of a secondary school, not a single certificate of capacity for teaching given by public authority professedly to teachers in schools above the primary schools. In any of these senses there is no public school and no public education for the middle and upper classes. The State might give test, stimulus, advice, dignity; it withholds them all.'

This account holds good to the present day. If we had

accurate and complete information of the supply and quality at the present time of our secondary schools, such as they are, we should have taken the first step towards introducing order into their chaos, and should be on the way to improvement. But we have not. Let me recount the principal data we have, and the conclusions to be gathered from them.

In 1837, the first year of the present reign, the Charity Commission concluded its inquiries, begun in 1818, into the charitable trusts in England and Wales. In 1842 a digest of the reports of this Commission was published. It showed 705 endowed grammar schools at that time in England and Wales, and nearly 2,200 other endowed schools which the Commission designated as 'non-classical.' No further classification of the endowed schools was given, and no estimate of their state of instruction.

Public Schools Act.

In 1862 nine of the 705 grammar schools were subjected to a very thorough inquiry by the Public Schools Commission, of which Lord Clarendon was chairman. Two other great secondary schools not classed among endowed schools answered so fully questions addressed to them by the Commission, that of eleven chief secondary schools we may be said to have acquired, through the report of the Commission of 1862, sufficient information. The schools were Eton, Winchester, Westminster, Harrow, Rugby, Shrewsbury, Charterhouse, St. Paul's, Merchant Taylors', Marlborough, and Wellington. Seven of the eleven became in 1868 the subject of an Act of Parliament—the Public Schools Act—which, in conformity with recommendations of the Commission, altered their constitution and established for them new governing bodies.

All the eleven schools, however, were previously in the public eye—were known and important, attracted much interest and criticism. In this way they gave a solid

guarantee. About twenty others might be added to them which gave a guarantee not so imposing, but perhaps adequate—the guarantee of a considerable, though more restricted, interest and publicity. All these schools gave guarantees, and were undoubtedly the best secondary schools of the country, and schools doing very good work. Dr. Arnold's son is not the fittest person to enlarge on what Dr. Arnold accomplished at Rugby before his death in 1842, and on the fruit so widely borne by his labours. The spirit in which many a chief teacher, and many and many an assistant teacher, have striven to do their duty in our great public schools during the last forty years, and not in our oldest and greatest schools only, but also in schools such as Clifton, the City of London, Repton, Uppingham, cannot be too highly honoured, or the good done by such labours be too highly prized. Still, the schools in question must all be regarded as points, more or less bright, emergent from a general darkness. Unillumined, around and beyond them, lay chaos; and unillumined, after the report of the Clarendon Commission, it still continued to lie.

Lord Taunton's Commission.

A far more important Commission was that of 1865, of which Lord Taunton was chairman, and in which the masculine character, strong sense, and thorough experience of Dr. Temple, now Bishop of London, exercised, I think, and most happily and usefully exercised, a leading influence. This Commission had to deal with the schools between the nine of the Clarendon Commission and the elementary schools—with the real body and mass, therefore, so little observed and known hitherto, of our secondary education. The report, published just twenty years ago, in 1867, is a mine of valuable information and sound and judicious comment. Twenty years have elapsed since it appeared, and nobody reads Blue-books; but if that report—or, at any rate, the first, second, third, sixth, and seventh chapters of

it—could be republished now as an ordinary book, at the price of sixpence or a shilling, it would, I believe, have a wide circulation and do great good.

The Schools Inquiry Commission found that, of the endowed schools designated as 'non-classical' by the Charity Commission, a certain number were secondary schools, and that the endowed secondary schools of the country were therefore nearly eight hundred in number. Into the condition of all of these, except the reserved nine, they inquired fully. The proprietary schools they found to be in number about eighty, and they inquired fully into the condition of these also. Finally, of the numerous private schools existing throughout the country, and amounting, it appeared, to more than ten thousand in number, they examimed specimens.

It is calculated that about twelve and one-half in every thousand boys of our population ought to be attending secondary schools. As the population stood in 1865, the Schools Inquiry Commission estimated the number of boys coming within the scope of their inquiry at about 255,000. The number of boys in England and Wales at the present moment who require secondary schools would, at the same rate of calculation, be about 320,000.

The report of the Schools Inquiry Commission appeared at the end of 1867. The Commissioners reported that the secondary schools, 'whether public or private, which are thoroughly satisfactory, are few in proportion to the need.' As to the endowed schools, 'there are few endowments applicable to secondary education which are put to the best use, and very many which are working to little or bad use.' Moreover, 'in at least two-thirds of the towns in England there is no public school at all above the primary schools, and in the remaining third the school is often insufficient in size or in quality.' Proprietary schools have in

certain places been established to meet the need felt, but though 'educationally they have very largely succeeded, commercially the majority have not succeeded.' Whatever their success, they, like the endowed schools, educate but comparatively few of those requiring secondary education. 'The total number of boys in endowed and proprietary schools for secondary education appears to be 52,000. If the total number of boys requiring secondary education be 255,000, nearly 80 per cent. of the whole are educated in private schools, or at home, or not at all.' In fact, the immense majority of these are brought up in private schools. But 'the state of the private academies, though not wholly without hopeful features, is lamentably unsatisfactory.' There are 'excellent private schools of the more expensive sort,' but 'we find a rapid deterioration as we descend in the scale of price, and most of those which we should reckon as belonging to the third grade are quite unequal to the task which they have undertaken.' On the whole, the Commissioners sum up thus: 'The result of our inquiry has been to show that there are very many English parents who, though they are willing to pay the fair price of their children's education, yet have no suitable schools within their reach where they can be sure of efficient teaching, and that, consequently, great numbers of the youth of the middle class, and especially of its lower divisions, are insufficiently prepared for the duties of life, or for the ready and intelligent acquisition of that technical instruction the want of which is alleged to threaten such injurious consequences to some of our great industrial interests. We believe that schools, above most other institutions, require thorough concert among themselves for their requisite efficiency; but there is in this country neither organisation, nor supervision, nor even effective tests to distinguish the incompetent from the truly successful; and we cannot but

regard this state of things as alike unjust to all good schools and schoolmasters, and discreditable and injurious to the country itself.

The Commissioners recommended a plan for bringing about the resettlement of educational trusts, so many of which were 'working to little or bad use;' for bringing about, also, that supervision, those effective tests for distinguishing the incompetent schools and teachers from the capable, and, with time, that general organisation and concert, which they considered so desirable for English secondary schools, and so grievously lacking to them. They had in view an organisation of secondary schools in three grades—the third and lowest to carry the scholar to the age of fourteen, the second to the age of sixteen, the highest to the age of eighteen or nineteen. 'The most urgent educational need of the country,' they said, 'is that of good schools of the third grade.'

In my opinion, the Commissioners erred in treating these third-grade schools as establishments for secondary education, and I suppose every one well acquainted with German schools must have shared that opinion. The Commissioners might very properly have insisted on the need in elementary education of such schools, but they should not, I think, have imported them into secondary. However, the Elementary Education Act and its developments have now made it sufficiently clear that to elementary education the third-grade schools belong, and I believe that in official schemes dealing with endowments for secondary instruction the third-grade school now rarely or never appears.

The Endowed Schools Act.

With this single exception, the views and recommendations of the Commissioners were excellent. In 1869 the Endowed Schools Act provided for the resettlement of educational trusts by a Commission which has since been blended with the Charity Commission. An Endowed

Schools Act No. 2 was to have provided for the supervision, the testing, the gradual co-ordering of our secondary schools. This Bill was dropped, and all the projected machinery of educational council, provincial authority, inspectors, examiners, disappeared. Ten years later, in 1879, Sir Lyon Playfair introduced a Bill for registering teachers engaged in intermediate education. To be on the register, future teachers must, after the Bill had become law, submit to an examination; and here, for the future at any rate, was an effective test for distinguishing the incompetent from the qualified teacher. But this Bill likewise was dropped.

What has been gained, then, since the Schools Inquiry Commission reported in 1867, has been a very extensive resettlement, for the benefit of secondary education, of charitable trusts. Many additional endowed schools, with schemes adapting them to present local wants, have thus come into existence. Proprietary schools, likewise, have multiplied considerably. The ten thousand private schools of 1867 may also undoubtedly be taken to have multiplied, although information in regard to this entire class of schools is greatly wanting.

Secondary education improved:

Those who find in all our history for the last fifty years nothing but glorious progress, and cause for jubilee, will say that, during that time, the immense development of the industrial and commercial energies of the country has been accompanied by the spread of modern studies and natural science in our secondary schools; that there is hardly now a provincial town of importance without its college of science or school of art; that the City guilds are powerfully aiding the movement; that companies provide day-schools for both girls and boys; that the examinations of the College of Preceptors ever since 1854, the Oxford and Cambridge local examinations ever since 1858, have afforded to our secondary education the tests and supervision requisite.

But whoever is not carried away by the torrent of jubilee, whoever has well observed our secondary schools and compared them with those of the Continent, knows that we have indeed broken up our old type of secondary instruction, but not yet founded a new one of any soundness and worth; that our provision of secondary schools is utterly incoherent and inadequate; that the local examinations supply us with neither the tests nor the supervision really requisite; that the bulk of the middle class in this country is worse educated than the corresponding class in Germany, Switzerland, Holland, Belgium, or even the United States; that it is brought up on an inferior plane, in schools both of lower standing and worse taught. The reason why no effective remedy is applied to this serious evil is simply, as I have often said, because the upper class amongst us do not want to be disturbed in their preponderance, or the middle class in their vulgarity. People call this an epigram; alas, it is much rather a scientific formula truly and closely summarising the facts. That many who cling to their preponderance or to their vulgarity, cling to them unconsciously, makes no difference. Their action is the same, and its hurtful consequence.

but still very defective.

I ask myself what seems at present possible in this great work of which Parliament and the nation so little grasp the scope and importance, the work of reforming our secondary education. I think it might be possible to get powers to ascertain, as was done for elementary education in 1870, the actual supply and its character. It would also be possible, I think, to carry a Registration Bill like Sir Lyon Playfair's, or even a better one. By that Bill every existing teacher was to have been recognised for the purposes of registration; it would be sufficient, surely, if every existing teacher over fifty years of age were so recognised. But younger teachers should not be so recognised; they should either produce

Registration of teachers.

their titles or pass an examination. If we abstain from bearing hardly on old practitioners, the public mind is ripe, I cannot but believe, for admitting that, in general, just as an apothecary ought not to practise without being registered and supplying proof of competency, so neither ought a schoolmaster. With more doubt I add, that it might be possible also to constitute the College of Preceptors, under proper conditions, as a public normal school for secondary teachers—the true function for that useful College, and a most valuable and far-reaching one.

Need of a Minister of Education.

I have spoken on this subject of middle-class education much and often. By too great persistency the advocate of a cause may indispose the public to it, and I would avoid that danger. Probably I shall never return to the subject again; let me for the last time, therefore, insist on the mischief to be cured and on the impossibility of curing it by makeshifts and half-measures. Uneasiness is felt as to the state and prospects of our industry, trade, and commerce; the blame is commonly thrown on defects of the working-class, and a remedy is by many people thought to lie in giving to this class more of technical instruction. The instruction of our elementary schools does indeed require, as I have said, to become more intelligent; but this will not be accomplished by making it more technical. Let the child have good primary schooling, with the rudiments of manual training, till the age of thirteen; let the technical school, for those who are fit to profit by it, come later. But the failure, after all, and the menace to the future of our industry and commerce, lies far more in the defects of mind and training of our middle class than of our lower—yet to those defects hardly any one will as yet open his eyes. The middle class in England has merits which the middle classes elsewhere do not possess; but it has peculiar disadvantages, and its disadvantages are at this moment very prominent. It has not

the training which local government affords to the corresponding classes abroad, and it has a school-education markedly inferior to theirs and formative for good neither of the mind nor of the character. Its religion has done much for it, its schools have done little or nothing. Unformed itself, it exercises on the great democratic class, rising up beneath or rather around it, no formative influence; and this class, too, loses means of training both natural for it and most wholesome. May we live to see the coming of a state of things more promising! Throughout the country good elementary schools, taking the child to the age of thirteen; then good secondary schools, taking him to sixteen, with good classical high schools and commercial high schools, taking him on further to eighteen or nineteen; with good technical and special schools, for those who require them, parallel with the secondary and high schools—this is what is to be aimed at. Without system, and concert, and thought, it cannot be attained: and these, again, are impossible without a Minister of Education as a centre in which to fix responsibility, and an Educational Council to advise the Minister and keep him in touch with the tendencies, needs, and school-movement of the time. May the founding of such a system signalise the latter years of her Majesty's reign, as the founding of public elementary instruction has signalised its earlier years!

MATTHEW ARNOLD.

A NOTE ON SCOTTISH EDUCATION.

THE last fifty years have been as eventful in the history of Scottish as of English education; but the progress which they mark has been based upon a different foundation, and has followed different lines. Down to the year 1833 England owed everything to voluntary effort; from 1833 downwards that effort was met by a contribution from the State; only in 1870 did the State establish a law by which the work which voluntary effort failed to overtake was imposed as a necessary task upon each locality; only in 1880 did compulsory attendance become universal. But when the State began to make a contribution to Scotland, also in 1833, she found there a very different state of things.

Even before the Reformation there were statutory provisions in Scotland on the subject of education, and most of the religious houses had schools attached to them. But as in England, so in Scotland, it was the Reformation which marked the chief advance. The rapacity of the Scottish nobles left few of the Church endowments available for education, and perhaps this very lack of resources prompted greater energy in supplying their place. The First Book of Discipline, promulgated by the Presbyterian Church in 1560, pronounced that there should be a teacher of the elements in every parish, and a 'Latin school' in every town, while the larger towns were to have 'a college for logic, rhetoric, and the tongues.' This decree of the Church Assembly did not, of course, possess legislative force, and it is difficult to say how far its proposals were realised. It was not till 1616 that the Privy Council, by a decree, imposed upon each parish the burden of supporting a school, and this decree was not ratified by Parliament till 1633. The disturbances of the next sixty years prevented any real progress being made, and it was not till 1696, after the Revolution settlement and the Presbyterian Church were secure, that the national Scottish system of education was founded by statute law. This statute imposed upon the heritors

(or landowners) of each parish the duty of supporting the parish school, and gave to the presbytery, or ecclesiastical court of the district, the power of enforcing this law by proceeding to establish a school at the expense of defaulting heritors. After the lapse of more than a century, the statute of 1803 extended somewhat the provisions of the law on the same lines; and between this and 1833, the Church spent much voluntary effort upon the task of filling up the wide gaps left by the statutory provision.

When the State came to the help of the localities in 1833, it thus found a national system in operation. The assessment levied upon the heritors was of the nature of a local rate, and in most of the towns a contribution from the public funds (or Common Good) was devoted to the maintenance of a burgh or grammar school. In the earlier years of the grants in aid, the help which they gave was, in Scotland, sought chiefly for the establishment of colleges for training teachers. Many of the old parochial teachers, whose freehold tenure of office and security from interference gave them a position, not lucrative, indeed, but independent, were educated in the Scottish universities; but, besides the parish schoolmasters, it was necessary to provide teachers of a humbler class. The Church had endeavoured to do this from her own resources, and the normal or practising schools of the Church in Edinburgh and Glasgow had, indeed, served as types to be followed in England; but the work was too costly to be carried on without State aid.

The public grants were therefore applied, in the earlier years, partly to these training colleges, established under the auspices of the Church of Scotland and (subsequently) of the Free Church, and partly in helping to build schools for localities which the statutory provision left destitute. It was in 1846 that annual grants were given to Scotland under the same Minutes of the Privy Council which applied to England. These grants were paid if, on the visit of an inspector deputed by the Education Department of the Privy Council, the school was found to be generally efficient. Such inspection was a new and, even in its modified form, not always a very popular institution. Many of the parish schoolmasters were unwilling to be enrolled in the ranks of certificated teachers, and, from a consciousness either of their dignity or of their inefficiency, they often chose to dispense with State aid rather than to accept State inspection.

For some years the operation of the State was tentative and partial, and it affected rather those schools which lay outside of the national system than those which were created by statute and supported by local assessments. The new arm of inspection was of narrow range, and the inspectors were rather commissioners for purposes of inquiry and advice, than officers charged with the minute gauging of results. It was in 1862 that the Revised Code, with its principle of payment by results, was introduced by Mr. Robert Lowe (now Lord Sherbrooke). If it was greeted with dislike in England, its reception in Scotland was not one whit more cordial. But, while in England it was attacked by the supporters of denominationalism, as a breach of the treaty which they maintained to have been made between themselves and the State, the grounds of attack in Scotland were chiefly, if not entirely, educational. It was confidently asserted that it would prove the ruin of the parochial schools; that it would lower the standard of education by making the grants depend only upon a narrow pass in elementary subjects; that it would degrade the moral tone and educative functions of the school, and substitute for all higher influences the mechanical cram necessary to reach a low level of uniformity.

But there was another principle of the Revised Code, accepted without complaint in England, which was repudiated with absolute unanimity in Scotland. This was the provision that grants should be paid only to schools for the children of parents 'who supported themselves by manual labour.' Circumstances made this a natural arrangement in England. In the first place, the higher classes appeared in England to be fully provided for in the great public schools, with their ample endowments for the rich, and in the grammar schools, in almost every town, for those of moderate means. But, in the second place, the restriction to the poor was an almost necessary condition of a grant which came to supplement only charitable effort, as in England. In Scotland, on the other hand, both the national tradition, bred of poverty, which had mixed all classes in the parish schools, and the fact that the national system was statutory, and not charitable, rendered any such restriction altogether inapplicable.

The resistance to the Revised Code in England was overcome; in Scotland it was invincible. So far as examination was concerned, the conditions of that Code were, indeed, applied, but the

results did not affect the payments, and an examination upon which no grants depended was not a very severe ordeal. Nothing short of complete failure, implying such inefficiency as would probably have been detected by the most cursory inspection, without individual examination, could deprive the teacher of his grant, which was a personal payment to himself. He could withhold from examination any children as to whose attainments he was doubtful; and strictures passed upon the elementary work of the school, while they did not affect his salary, might be palliated by an appeal to the excellent appearance of a few selected boys. By successive suspensory Minutes, the operation of the Revised Code in Scotland was kept within these limits for the next ten years.

The interval was avowedly one in which proposals for further progress were ripening. There was much that was admirable in the old Scottish system of parish schools. In these all classes mixed. The education given was a national inheritance, for which they were indebted to no charity, and to accept which implied no obligation. The teacher was in many, perhaps in most, cases, a man who, if he had no great professional skill, had attainments sufficient to prepare a promising pupil for the university, and these schools often served as the ladder through which the poorer might reach eminence. The preponderating prevalence of Presbyterian tenets, identical for all educational purposes amidst the minute distinctions of Scottish sects, made the religious difficulty a small one; and even the small Roman Catholic community was provided for by a conscience clause which operated by usage in all parish schools. The grant in aid, with the statutory assessment and the school fees, provided for the teacher an income which, if it was small, was valued for its security. If inspection was somewhat lax in its conditions, the popular appreciation of the advantage of education was perhaps a sufficient guarantee for general efficiency.

But good as it was, the system required expansion. It did not meet the growing requirements of the large industrial towns. It left wide gaps, both in towns and in outlying districts, which were covered only by the unorganised and casual efforts of benevolence, sometimes guided by sectarian rivalry more than by educational zeal. If the religious difficulty was absent from the teaching, it was operative as regards school management. The

rank and file of the children, again, were too apt to be neglected for the benefit of a selected few. And, lastly, however good might be the supply of schools, there was no power to compel parents who were neglectful to give their children the advantages which they offered. All these evils were made evident by the Commission of Inquiry which, under the presidency of the Duke of Argyll, sat almost concurrently with that in England, and which reported in 1867. Out of about 500,000 children of school age, the Commission found that more than 90,000 were at no school at all, and of about 400,000 at school only about one-half were at schools whose efficiency was tested by inspection. Efforts were accordingly made from time to time to legislate. The English Bill blocked the way in 1870; and finally, in 1872, Lord-Advocate Young passed an Education Act which revolutionised the Scottish national system.

Unlike the English Act, that Act provided not for elementary education only, but for the better education of 'the whole people of Scotland.' It regulated not only the parochial, but the burgh or grammar schools. It contemplated a close connection between the universities and the schools, and specially enjoined the maintenance of a standard of education as high as had hitherto prevailed.

But it was distinguished from the English Act not only in its aim and scope, but also in its machinery and in the powers which it conferred. School boards, with the power of levying rates for the establishment of public schools, were not to be fortuitous, but universal. These boards, as in England, were to be elected by the ratepayers, on the 'cumulative' vote principle—an arrangement more satisfactory, perhaps, as regards the representation of minorities than as regards educational efficiency. In these boards the parish schools, as well as the burgh schools in towns, were vested by the Act. Upon the school board was to rest the whole responsibility for school provision, except in so far as voluntary energy might be willing to supply a gap, or provide for denominational needs. Every Board school was to be open necessarily to inspection; and while in every inspected school a conscience clause was necessary, the religious teaching, even in public schools, was (subject to that clause) a matter in which each school board was supreme, without any restriction as to the use of religious formulas. The Education Department was

authorised to give aid to the boards in providing the accommodation immediately required, but thereafter the boards were to make that provision from local resources, raising loans for the purpose on the security of the rates. For the guidance of school boards in the original provision of schools, a Board of Education was maintained in Edinburgh for six years. On its demise, there remained only the local authority, represented by the school boards, and the central and grant-distributing authority, represented by the Scotch Education Department of the Privy Council. The compulsory power was not introduced, tentatively and partially, as in England, but was vested in each school board, and thus made as universal as the school boards.

Since the Act of 1872 two Education Acts have been added to the Scotch Statute-book—those of 1878 and 1883. They relate chiefly to matters of detail—the adjustment of relations between school boards; the conditions of exemption from school attendance, which are fixed by statute, and not by by-laws as in England; and the regulations which affect the higher class schools under school boards. They do not modify any of the leading principles upon which the Act of 1872 was based.

With the new Act, and the vastly increased burden which it placed upon the public exchequer, the adoption of the principle of payment according to results, embodied in the Revised Code, was considered to be inevitable, and, accordingly, it was adopted in the Scotch Code of 1873, by which, as modified from year to year, the action of the Scotch Education Department in the distribution of grants has since been determined.

As to the results of this Act, it was inevitable that some of the benefits of this older system should be lost; and opinions will vary as to the compensation which is to be found in the completeness of the new system, in the opportunities which it gives for reaching a class too likely to be neglected, and in its provisions for testing efficiency. Those who most dislike the system of payment by results may see in it an influence degrading to education; and others may fear that the new arrangements may become mechanical from their very complexity. But, on the other hand, there are obvious advantages to be found—in improved accommodation, in the wider interests resulting from representative management, and in the enormously increased attendance. Of 500,000 children, the Commission of 1867 had found that

about 200,000 were at inspected schools. In 1873 there were about 280,000, so that the mere passing of the Act had given a stimulus. But since then the progress has been very remarkable. There are now very nearly 600,000 names on the school registers, with an average attendance of 450,000, or about 75 per cent. of the number on the registers. The standard of education, so far as that can be judged from the test of examination, has risen so that 70 per cent. of the children who are over ten years of age pass the fourth or a higher standard, while a few years ago the percentage attaining that standard was less than the half of 70 per cent. If the function of the old parish school is not completely performed under the new system, it is still possible to point to more than 60,000 children who are annually presented for examination in such higher subjects as Latin, Greek, and mathematics.

The cost of providing schools, since the Act of 1872, has reached above 3,000,000*l.* sterling, and of this nearly 600,000*l.* has been defrayed from the Parliamentary grant. During the same period the total cost of maintaining schools has been about 10,000,000*l.* The annual cost is now about 1,000,000*l.*, of which about 400,000*l.* comes from the Parliamentary grant, something less than 300,000*l.* from fees, and a little more than 200,000*l.* from local rates. The deficit is supplied from contributions and endowments.

It may be doubted whether the advance in secondary education has kept pace with the progress to be recorded with respect to the ordinary schools, aided by Parliamentary grant. The secondary schools are scantily endowed, and complaints are made that their proper sphere is encroached upon, by the grant-earning schools, on the one hand, and by the universities on the other. The latter have no compulsory entrance examination, and open their doors to students whose previous education has been no more than elementary. School boards can, indeed, aid these secondary schools from the rates, and have sometimes done this with no niggard hand; but they may often dread an expense which falls altogether upon one locality. The best resource for improving the higher education must be found in the proper application of the educational endowments, whose original purposes have become obsolete. These in Scotland have been estimated to amount to nearly 170,000*l.* a year. A Commission

of Inquiry investigated these in 1872, and in 1878 an Executive Commission was appointed which revised the administration of such trusts as voluntarily had recourse to their aid. Since 1882 a new Commission has been dealing more stringently with the remainder; and when this work is completed, and the functions of the universities are revised under impending legislation, it will be possible to judge to what degree the provision for secondary education is deficient, and in what way Scotland must apply her efforts in this direction, if she is to maintain her traditional reputation for educational activity.

THE UNIVERSITIES.

OBSERVERS accustomed to the system and the regularity of centralised States on the Continent have often noticed with some surprise how in England institutions of an old, and even an obsolete, type are allowed to continue in existence after others more in accordance with the needs of the time have sprung up by their side. Revolution has never cleared the ground; corporations are powerful; the public indulgent or illogical. And so it happens that while the creating or reforming work of an epoch of change abroad may be expressed almost by figures and dimensions, in England we have to tell how one feature or another of some venerable but narrow edifice is made tolerable for modern use; how the designs of a middle time are developed or enlarged; and in what form the workmen of our own day have in their turn added to the inheritance of the past. True of English institutions generally, this is peculiarly true of our Universities; and in order to describe what the present reign has done for these foundations, we must rather fill in a series of groups on the canvas than examine reports of numbers and statistics.

Oxford in the 18th century.

It may be doubted whether any so-called learned society, professing at the same time to be an educational body, ever sank lower than the University of Oxford in the last century. There were no doubt throughout the worst times some few men who privately pursued study; but

when this has been said, all has been said. The University and the Colleges neither taught, nor maintained discipline, nor examined. The professors had, with rare exceptions, ceased to lecture; there was no examination for degrees; there were no distinctions for merit. Within the Colleges the fellowships were with some few exceptions appropriated to persons born in particular localities, or educated at particular schools, or connected by descent with the founder: moreover, the great majority of Fellows were bound to be clergymen. The scholarships were in part attached to schools, the remainder were usually bestowed by favour, as pieces of private patronage. In some cases, as at New College, the nomination to a school scholarship carried with it the certainty of a College scholarship and fellowship; such nominations were therefore sought as soon as a child was born, and the Fellow of New College was in fact appointed in his cradle. Every undergraduate on matriculation was compelled to subscribe to the Thirty-nine Articles and to declare himself a member of the Church of England. The University was thus closed to Nonconformists. Most of those who came up, came with the view of taking Orders, and the University was regarded both within and without as in the main a training place for the clergy. But the instruction given amounted to little or nothing; life was loose and coarse, and at the end of three or four years' residence a man might take his degree and go away with no more knowledge than he brought up with him. Among the resident Fellows there was scarcely a pretence of learning or of the love of it. They were dull, often hard-drinking men, who had gained their posts without exertion, and held them without profit to themselves or others, waiting for the time when a College living should enable them to marry and to devote their days to domestic ease.

It was at the beginning of the present century that light

Reforms between 1800 and 1837.

began to break in upon these dark places. It was felt to be a scandalous thing that the University should give its degrees without any examination; and the first step in reform was the establishment of an examination for the B.A. degree, accompanied by the publication of the names of the twelve men who had most distinguished themselves. This rudimentary separation of the sheep from the goats soon afterwards developed into the Honour Lists in Classics and Mathematics; and from this time the spirit of emulation, though working in a comparatively narrow circle and under many discouraging conditions, brought back to Oxford elements of vitality which had been absent for generations. Peel, Keble, Arnold, Whately, Milman, adorned the early class-lists. Ere long the better Colleges began to think of opening their fellowships to general competition. Whether there existed any authority but the Legislature which could legally alter the existing statutes, with their antiquated preferences and restrictions, was more than doubtful. Two Colleges, however, took the law into their own hands. Oriel, throwing open its fellowships, made itself the home of a body of men of whom many were destined to leave their mark on English life. Balliol, opening its scholarships as well as its fellowships, gained an educational pre-eminence which it retains to this day. Beyond this reform did not far extend. The Tractarian movement, which began soon after 1832, gave indeed a certain stimulus to learning, but it was primarily to learning of a theological kind. Under Newman's auspices men set themselves to study the Fathers or to edit Lives of the Saints. They passed laborious hours; and the more fortunate among them were like persons digging for archæological remains who accidentally come upon a mine; for in their researches into Church history they stumbled upon the rich store of historical interests and historical research generally. It is indeed

little more than a paradox to say that the important group of Oxford writers, from Froude to J. R. Green, who have done so much for the history of England, were a product of the Tractarian movement. The spirit of inquiry into mediæval history was in the air a generation earlier, and it extended over all Western Europe, as the names of Ranke, Guizot, and Sir Walter Scott will suggest. But the Tractarian movement no doubt gave to it a peculiar stimulus, and led men to be readers who would not have become so without theological interests.

At the accession, therefore, of Queen Victoria, Oxford had indeed risen some degrees above the low-water mark to which it had sunk under the Georges. Men of eminence were not wanting to it. Its studies, however, were still narrow, its constitution radically bad, its usefulness restricted to members of the Church of England, its spirit exclusive and ecclesiastical. Cambridge was in somewhat better case. It had never fallen so low as its rival. From the middle of the eighteenth century, if not earlier, its Mathematical Tripos or Honour List had powerfully stimulated one most important study, and supplied, though within a narrow range, a thoroughly genuine test of merit. Its fellowships were for the most part free from restrictions as to place of birth or education; and, though each College filled up vacancies from among its own younger graduates, the choice within these limits almost invariably fell on those who had taken the best places in the University class-lists. In 1825 the Classical Tripos was established, and from that time the 'dead languages' became a recognised avenue to distinction and reward. As at Oxford, there were among the residents some men of great talent and reputation. Whewell, Thirlwall, Hare, could hold their own against any visitors from London. Nor was Cambridge quite so heavily weighted with theological fetters as its

Cambridge before 1837.

rival. The Nonconformist was indeed debarred from taking his degree, but he was allowed to go through the undergraduate course, and to take honours. There was less of ecclesiastical prejudice and intolerance than at Oxford, though enough to cause some unpleasantness to a Nonconformist student. Manners were in most of the smaller Colleges extremely rough, and worst perhaps among the seniors. There was scarcely any teaching worthy of the name; and though the men competing for higher places in either Tripos worked day and night, the standard of the Pass degree was still, as at Oxford, so low that an ordinary schoolboy of fifteen could have passed it with a few weeks of reading.

Internal reforms, 1837-50.

In the general activity which belonged to the epoch following the Reform Bill, the shortcomings of the Universities did not escape attention. Demands for a public inquiry were raised in the House of Commons and elsewhere; but the nation had at that time more pressing business on its hands, and it was not until the second decade of the present reign that any strong public feeling was aroused on the question of University reform. The governing bodies of Oxford and Cambridge had now become conscious that changes must be made. Cambridge established new Honour Lists for Law, for Natural Science, and for Moral Science; Oxford passed a comprehensive statute creating a school of Physical Science, and one of Law and Modern History combined, and also breaking up the long period of the student's idleness by requiring him to pass an examination, called Moderations, when half-way through his course. If, however, these changes were intended to avert the intervention of Parliament, the hope was not fulfilled. In 1850 Lord John Russell appointed a Royal Commission for the purpose of holding an inquiry into the 'state, discipline, studies, and revenues of the University and Colleges of Oxford.' Two

Royal Commissions, 1850 and 1852.

years later a similar Commission was appointed for Cambridge. The reports of the Commissioners were followed by legislation, to which one at least of the Universities owes its delivery from shackles against which, without external help, its own best elements would have struggled in vain.

The Commissions at work.

Parliamentary Blue-books are not generally held to be lively reading; yet the reports of the Oxford and Cambridge Commissions contain page after page of matter which the least academic reader will scarcely pronounce dull. There is indeed a considerable difference between the two reports. The Cambridge Commission, whose principal members were Sir John Herschel, Dr. Peacocke, Dean of Ely, and the present Lord Derby, had no doubt less to complain of; but its work is marred by a certain unctuousness of tone, and by an obvious desire to make things pleasant for everybody. The Oxford report is, merely taken as a piece of exposition, greatly superior to its counterpart. The Commission included some singularly able men: among them, Dr. Tait, then Dean of Carlisle, afterwards Primate; Dr. Jeune, then Master of Pembroke, afterwards Bishop of Peterborough; Dr. Liddell, now Dean of Christ Church; and Professor Baden-Powell. The secretary was the Rev. A. P. Stanley, afterwards Dean of Westminster, assisted by Mr. Goldwin Smith. From the beginning to the end of the report there runs a tone of resentment and indignation against the defenders of abuses, which breaks out occasionally into telling sarcasm, and which culminates in the declaration—truly remarkable as coming from a body in which there were only two laymen to six clergymen—that all clerical restrictions ought to be abolished. But if the language of the Oxford Commission was vehement, the constituted authorities of the University had mainly themselves to thank for it. While individuals freely gave the evidence

that was asked of them, the governing bodies, both of the University and of the Colleges, generally refused to answer any inquiries, and sent back to the Commission the opinion of Mr. Bethell, Counsel to the University, and other lawyers, that the Commission had itself been illegally and unconstitutionally issued. Dr. Gaisford, Dean of Christ Church, declined even to acknowledge letters; Dr. Routh, President of Magdalen, then in his ninety-sixth year, replied that he was not aware that he had misused his College revenues, and closed the correspondence with the abruptness of a man who had no time to waste upon trifles; Dr. Philpotts, Bishop of Exeter, as Visitor of Exeter College, not only hectored the Commission on his own behalf, but informed them that he had warned the members of the society over which he was set that they could not, without guilt of perjury, answer the inquiries addressed to them.

Report of the Oxford Commission.

It was in the department of finance alone that this official obstruction caused any real difficulty to the Commissioners, or impaired the completeness of their work. Copies of the statutes refused at headquarters were easily procured from the British Museum, and on all that related to studies and discipline abundant evidence was given by men of every shade of opinion. Fortified with a convincing body of testimony, the Commissioners sent in their report to her Majesty. They pointed out, in the first place, that the existing governing body of the University, consisting of the Heads of the Colleges assembled in the Hebdomadal Council, was thoroughly unfitted for its work. The Heads were described in the most uncomplimentary terms; they were too often effete, incompetent old gentlemen, who had got their places by jobbery or management, and who had lost all touch with the higher educational or literary interests around them. A new governing body required to be created, and this the Commission desired to draw from

the persons actively engaged in the work of the University. Passing on to the inquiry how far the University fulfilled its duties towards the nation at large, the Commissioners showed that in spite of its noble endowments, and in spite of the immense increase of the population, Oxford, once so thronged, now scarcely drew to it three hundred students a year, of whom almost all belonged to the wealthier classes or were intended for the clerical profession. One cause of this paucity of numbers was the rule, first introduced by Archbishop Laud's statutes of 1629, that every student must belong to some College or Hall. College life, even when not extravagant, was not easily made economical; nor was there any sufficient reason for limiting the number of students by the accommodation that could be provided within College walls. The Commission therefore suggested not only that individuals should be permitted to open private Halls for the reception of students, but that the ancient custom of admitting undergraduates to the University without their becoming members of any College or Hall whatever should be revived. They strongly condemned the subscription to the Thirty-nine Articles required at matriculation, and recommended that it be forthwith abolished.

Studies, and system of instruction.

The next section of the Commissioners' report was devoted to the studies of the University. They mentioned with approval the statute of 1850, establishing the schools of Modern History and Natural Science, and confined themselves to the suggestion that certain modifications should be made in this scheme, that a museum with laboratories and lecture-rooms should be built, and that various boards of studies should be established, which it is not necessary to enumerate here. They urged, and with good reason, that if the new studies were to be seriously pursued, it was essential that they should be allotted their fair share of rewards. Mathematics had been nominally on a level with

classics for half a century; but, inasmuch as fellowships had scarcely ever been given for mathematics, this study had never taken any real root. On the subject of the instruction given at Oxford, the Commissioners spoke with great frankness. Professorial teaching—that is, the teaching given by the University as distinct from the teaching given by the Colleges—had become almost extinct. Though occasional public lectures of great interest had been given by Dr. Arnold and others, it was a novelty to most persons to hear that there ever had been, or that there was any need for, a system of instruction independent of the classes of the College Tutor. The Heads indeed, in a letter to the Duke of Wellington, had described the cessation of professorial teaching as a 'temporary interruption.' The interruption, however, had been the rule and not the exception for a century and a half. Professorships had become sinecures: they were for the most part poorly endowed; and in the absence of all central organisation their holders had neither the duty nor the opportunity of exercising any systematic influence upon the studies of the place. The College Tutor, who had superseded all the old public teachers, was not an inspiring person. Responsible, with two or three colleagues, for the supply of instruction to all the undergraduates of his college, whatever their difference in knowledge, capacity, or aim, his classes were a weary round of drudgery and routine, where, year after year, the duller men were put through their drill, and the abler men endured unspeakable boredom. The Tutor himself had seldom much interest in his work. Forbidden to marry, destitute of prospects within the University itself from the paucity of professorships and similar appointments, he looked forward to his College living as the only real end of existence. 'You are anxious to get a fellowship now,' said the father of the late Mark Pattison to his son;

'believe me, you will be a thousand times more anxious to get rid of it some years hence.'

Proposed restoration of University teaching.

For this unsatisfactory state of things the Commission saw a remedy in the revival and extension of the professorships of the University. Funds now wasted in the maintenance of an excessive number of unprofitable Fellows might be employed in maintaining in the University a body of men really eminent in learning, and devoted to the career which they had chosen. The professors, rationally selected, adequately paid, emancipated from clerical and other restrictions, and bound by the tenure of their office to the performance of certain duties, would not only represent in themselves the highest intellectual life of the University, but would influence and inspirit all those subordinate grades from which in due time their successors would be drawn. The professor at an English University should be something more than a conduit-pipe to convey the learning of others: he should be a spring of fresh knowledge, adding to the mental wealth of his time, and fertilising fields far beyond those immediately surrounding him. In order that thought and study should not be unduly sacrificed to instruction, a body of University lecturers should exist by the side of the professors, relieving them of a part of their educational duties where these were heavy. The condition of celibacy, to be retained in the case of ordinary Fellows, might be abolished in the case of those who were either professors or University lecturers. When therefore the latter became fairly numerous, a career would be opened to men of learning which at present Oxford could not offer. Instead of surrendering himself to the service of dunces, until a College living should enable him to marry and to forget his Latin and Greek altogether, the Tutor would, if so disposed, find it to his advantage to follow some branch of study in a serious spirit; while the better division of labour would save him

from the necessity of having to teach a multitude of things indifferently. To realise this scheme in its completeness, two things would, however, be necessary. In the first place, a large number of fellowships must be suppressed, or appropriated to University teachers; and, in the second place, the ascendency of the most ignorant among the pupils in College lectures must be tempered by the establishment of a matriculation examination, conducted by the University itself, and enforcing a better standard than that which now satisfied the inferior colleges.

Principle of open competition.

Excellent as these recommendations were, they were perhaps not of such vital importance to the future of Oxford as the simple and emphatic declaration of the Commission that the principle of open competition must henceforward be applied to fellowships and scholarships. The paralysing effect of local preferences and restrictions, and of the absurd privileges attaching to founders' kin, was demonstrated by a comparison of the open with the close Colleges. Oriel and Balliol, with their scanty resources, had outshone all their rivals; Magdalen, with revenues of 23,000*l.* a year, had become a sort of hospital for incurables. The latter College, which from its wealth and its splendid buildings ought to have been the foremost in the University, was indeed an example of everything that was worst. Not only were the old local restrictions in full force, but, in defiance of the tenor of its statutes, appointments to fellowships and scholarships were made to depend upon personal favour; 'a disgrace and abuse,' continued the Commissioners, 'peculiar to Oxford. At Cambridge such elections are said to be unknown; in Oxford they are happily confined to certain colleges.' Passing beyond the example of the sister University, where each College chose from among the best of its own members, and saving the rights of Wales at Jesus College, the Commission recommended that all fellowships,

except those appropriated to professorships and similar offices, should be thrown open to general competition among all members of the University. With the view of rendering University education more generally attainable, they proposed that the number of scholarships should be largely increased and their value augmented. These also were, in the great majority of cases, to be thrown open; where, however, scholarships were attached to particular schools, and the school had a sort of joint proprietary interest with the College, existing arrangements might to some extent continue. The Commission completed its work with a recommendation that the University and the Colleges should in future have power to alter their statutes with the consent of some public authority; and that the obsolete and objectionable oaths, by which in most Colleges the Fellows had been bound to resist any alteration of the statutes and to withhold all information as to the affairs of their society, should be declared illegal.

Report of the Cambridge Commission.

The report of the Commission on the University of Cambridge followed on the whole the same lines. The abuses that called for animadversion were fewer in this University; on the other hand, there was the same complaint of the total absence of central organisation, of the unfitness of the Heads as the leading authority in the University, and of the bad quality of the instruction usually given. The latter appears to have been even worse than at Oxford, if we may judge from the fact that recourse to private tutors had become all but universal among men who wished to learn anything. The Commission made the same general recommendations as those above described: the establishment of a representative council, the extension and remodelling of the professoriate, with various boards of studies; the improvement of the material appliances for scientific instruction and research; and the removal of most of the

remaining restrictions upon fellowships and scholarships, which indeed were insignificant in comparison with those at Oxford. In one respect the Cambridge Commission was distinctly in advance of its predecessor. Relying upon insufficient evidence, the Oxford Commission had concluded that it would be useless to attempt to establish a medical school in a comparatively small provincial city. The Cambridge Commission, better informed as to the statistics of the medical schools on the Continent, maintained that the attempt ought to be made. Experience has justified their conclusion, and the medical school at Cambridge is at this day a flourishing reality.

Legislation of 1854 on Oxford.

It was at the moment when the Crimean war was breaking out that Lord John Russell introduced into Parliament the measure framed by the Government of that day upon the report of the Oxford Commission. The Bill fell short of the recommendation of the Commissioners in not abolishing the subscription to the Thirty-nine Articles at matriculation, and in removing clerical restrictions only where three-fourths of the Fellows of a College were already in Orders. In most other respects it embodied the reforms proposed in a fairly adequate form. It was, however, a measure of extreme complexity. Its earlier clauses created a new Council and a new Congregation as the governing bodies of the University; empowered the opening of private Halls; and laid down the principle of open competition for fellowships and scholarships. Its later clauses had for their object the extension of the professoriate, and the establishment of an increased number of scholarships and exhibitions out of College revenues. For this purpose the Bill proposed to create an executive Commission, which, in combination with the Colleges, should draw up new statutes regulating the disposal of their endowments and devoting a portion of them, not ex-

ceeding one-fifth, to University purposes. The Bill was not seriously opposed on its second reading; on reaching Committee every clause raised a struggle. The Government, on the whole, carried its points; but so slow was the progress made that, before half the clauses had been reached, Lord John Russell announced that the Government must strike out the elaborate directions which were to govern the executive Commission, and substitute for them an arrangement which practically left it to the Colleges themselves to draw up their new statutes, reserving to the Commissioners little more than a power of approval or rejection. In its passage through Committee and through the House of Lords, the Bill, so amended, underwent some changes for the worse and some for the better. Mr. Heywood carried against the Government an amendment abolishing the theological test at matriculation; and a later vote, which was stated to have been gained by surprise, abolished it in the case of all lay degrees. The House of Lords insisted on undoing this vote in relation to the M.A. degree, but left the B.A. degree open to Nonconformists. It had not been intended by the Ministry, when the Bill was introduced, that the abolition of tests should in any way enter into the discussion. After the considerable victory, however, which had been gained by the friends of religious equality in the House of Commons, it became evident that the complete opening of the endowments as well as the honours of Oxford to those who were not members of the Church of England was now only a question of time.

The executive Commission.

The Bill became law in the summer of 1854, and the executive Commission then began its work. Its composition was distinctly inferior to that of the Commission of Inquiry; and indeed there would have been little advantage in placing very eminent men upon a body which was liable to have its conclusions overruled by the vote of a majority

of two-thirds in any College. The statutes which now came into being were satisfactory in so far as they embodied the principle of open competition, and largely increased the number and value of scholarships; but the obligation to take Holy Orders was retained in the case of many fellowships, and the expectation that the Colleges would of their own free will devote any large portion of their revenues to University purposes proved entirely illusive. It was only in some exceptional cases that the Colleges assented to any such appropriations, and in consequence the ideal professoriate remained nearly as far off as ever. Nevertheless a new and a healthy epoch in the history of the University had now commenced. Men who were in earnest felt that the old power of inertia and jobbery was broken, and that the future lay with themselves. Science manifested a vigorous youthful appetite, and clamoured for its observatories and museums. The Heads consoled themselves with University sermons; a throng of energetic young men, victorious in competition, descended like birds of prey upon the sleepy common-rooms. New books were studied, new ideas canvassed; and gradually, while the number of students largely increased, there grew up even in the most benighted of the Colleges little bands of ardent persons to whom the one thing intolerable was the Toryism and the clericalism of the fading *régime*. At Cambridge, which was dealt with by Parliament on the same principles two years after Oxford, the revulsion from the old to the new seems to have been far less exciting and sudden.

Effect of these changes.

Cambridge.

Twenty years passed before the Legislature again found it necessary to review the internal affairs of the two Universities. In the meantime, however, the abolition of religious tests was repeatedly brought forward in the House of Commons; and after passing that House half a dozen times, was at length, in the year 1871, carried through the

Abolition of tests.

House of Lords. The power given by Parliament to the Colleges to alter their statutes, with the consent of the Privy Council, led to some further useful changes being made in a few cases, as the shortcomings of the system established in 1854 came into view. Competition had done much, but it had not done everything. It was found that a majority of the young men who gained open fellowships left the Universities after a year or two of residence. They had no intention of taking Orders and waiting for livings; the new offices which would have held out to them some fairly good prospects as students or teachers had not as a matter of fact been created; and their position, as regarded any permanent settlement in life, was therefore worse than that of the easy-going clergymen who had preceded them. They naturally sought new callings before it was too late; and the consequence was that the government of the Colleges seemed likely to fall into the hands of a succession of mere lads on their way to the Bar or the editorial desk. Nor, if they remained at the Universities, did the men who had most distinguished themselves in examinations always prove competent teachers. When the old danger of jobbery had passed away, it was felt that a power of appointment, to be exercised under certain stringent conditions, might advantageously supplement the system of competition. Such a power of appointment might also enrich the Colleges with the membership of persons of eminence in literature, art, and science, who would not dream of submitting to examination. There was growing up, both in the Universities and elsewhere, a strong feeling that independent study and research, as distinct from active educational work, deserved much more ample provision than had hitherto been made for them. It was not so much the fault of the earlier Commissions as of those who had imperfectly carried out their plans that in this respect the Universities had so

Further changes seen to be necessary.

little made good their deficiencies. Other changes were also seen to be inevitable. Celibacy could no longer be maintained. It had been granted a reprieve in 1854, but with misgivings; and the whole spirit of the time now decisively condemned it. A raid upon sinecures was also in contemplation. Macaulay, to whom it is said that non-resident fellowships owed their escape from extinction at the hands of Lord John Russell, was no longer alive. The misuse of these endowments would in some instances have needed a stout defender; and a general and very reasonable opinion had grown up that, except in cases where some recognised study was pursued, the enjoyment of a non-resident fellowship ought to be limited to six or eight years.

Legislation of 1877.

Thus a further course of legislation was seen to be necessary, in part to facilitate changes already in progress, in part to overcome resistance where this could not be overcome from within. As a preliminary measure, an inquiry into the revenues and financial prospects of the two Universities was held in 1872 by a Commission headed by the Duke of Cleveland. Materials, the want of which had given indefiniteness to earlier schemes of reorganisation, were thus accumulated; and in 1876 Lord Salisbury, who was in a large measure conversant with the views of the latest school of reformers, introduced Bills for the better management of the two Universities. These Bills were withdrawn in order to be succeeded in the following year by a single measure embracing both societies. The main purpose in view was the strengthening of the central authority in each University; the enforcement of system; the subordination of lesser corporate interests to the needs of the whole. Two executive Commissions were created, on which each College was allowed to be represented while its own affairs were being dealt with; no power, however, was

given to the Colleges, as in 1854, to override or obstruct proceedings which were not according to their mind. The work of the Commissions proceeded slowly, but without much friction. Elaborate schemes were drawn up, by which each College was compelled to contribute part of its income to the University. New professorships were established, the duties of the old ones more strictly regulated. Prize fellowships were, as a rule, distinguished from working fellowships, and made tenable for a limited time. Restrictions on marriage were almost wholly abolished; the power of appointment without examination was largely granted; and many of the Colleges received the right of bestowing their fellowships upon men doing good work in literature, art, or science, even if hitherto unconnected with the Universities and pursuing their labours at a distance. One additional reform, which perhaps was not foreseen by Lord Salisbury, dates also from this time. Clerical fellowships were almost entirely abolished. The general election of 1880, though it did not break off the action of the Commissions, was powerfully felt by them within twenty-four hours of the first declaration of the polls. It would have been vain to present to the new House of Commons statutes weighted with ecclesiastical privilege; and the clerical headships and fellowships, which had hitherto found influential defenders on at least one of the Commissions, now sank unmourned. In the course of the next two years the long and much interrupted labours of the two Commissions were brought to a conclusion, and the statutes which they had drawn up became the new code of law for the Universities and the Colleges.

The completion of the first fifty years of her Majesty's reign brings us therefore to the close of a period of legislation which has to a great extent transformed the system and the constitution of our two ancient seats of learning.

The results of this legislation cannot yet be judged.

This legislation stands complete before us; the changes accompanying and resulting from it are not yet to be summed up. A later generation will decide to what extent the promises and the hopes of the last thirty years have been fulfilled; whether the science of the Universities is to be a thing ennobling and elevating the mind of man; whether their literature and their scholarship shall adorn, not cumber, our national treasure-house; whether, in addition to the comparatively easy task of opening a career to great talent springing from humble homes, they shall in any degree advance us in the solution of that far deeper human problem, how the lives of the broad mass of the ungifted and the unambitious may be redeemed from barrenness, and occupations which are now servitude may be relieved by a companionship with noble thoughts and things. All this lies in the future; it may, however, be well to note some of the actual changes in the present state of the Universities as compared with their condition fifty years back. In the first place, the number of students has been greatly increased—on an accurate comparison, probably not less than threefold, though the older lists are filled out with names which would not now be included. The conception of the Universities as mainly a training place for the clergy is extinct. All legal restrictions excluding persons not members of a privileged religious body have disappeared. By the admission of students who are not connected with any College or Hall, the cost of a University education has been reduced practically to that sum on which a person may be able to support himself, living where he chooses within a certain radius; and although the 'unattached' student necessarily remains without the comradeship and other indefinable advantages of College life, the means of instruction are open to him abundantly, and he is almost certain at some time of his career to have the opportunity

Changes recently effected.

of making acquaintance and friendship with men of high merit and reputation. The range of studies has been greatly enlarged, more especially in the domain of the natural sciences. The highest kind of instruction is more largely given; the ordinary work of tuition much better performed. Institutions and appliances for study, whose very names were unknown fifty years ago, have sprung up in abundance. Museums of Natural History, Observatories, Laboratories, diversify the scene with forms of architecture as novel as the sciences which they represent. Endowment has been freely granted in departments of knowledge where none existed before. On the whole, it may be said that, regarded as schools for the completion of a good education on the English type, the Universities are enormously superior to what they were. But even from this point of view there is something that still calls aloud for correction. By the side of the men who turn to good account the opportunities offered them, there exists the great mass of idlers sent up merely for social or conventional purposes, who drag down the educational level in many of the Colleges, and perpetuate a tradition of almost childish self-indulgence and devotion to amusement. The Pass degree, though somewhat better than of old, is still a very poor affair. Statute may follow statute; but until there arises a sufficiently strong body of opinion among the authorities of the Colleges, no adequate reform will be made from within in this direction. If hundreds of men are admitted who up to nineteen have only learnt how to enjoy themselves, they, and not the examiners, will set the standard of the Pass degree. By one very simple enactment Parliament might indeed cure the evil at a stroke. A Bill consisting of a single clause, requiring that every undergraduate of Oxford or Cambridge should have passed the matriculation test at London University, would do more good than the institution of

Museums.

countless Boards of Studies. Nor could it with decorum be opposed; for resistance would amount to a confession that in the wealthier Universities the earliest examination of the student may be still, like his latest, a sham, whilst at the University of London it is a reality.

Is there more, or less, of individual superiority?

To the ordinary parent who in the time of William III. sent his son to Cambridge, the most interesting matter was no doubt the education which his son would receive; to ourselves it seems more interesting and more important that Cambridge should then have had among its members Sir Isaac Newton. And perhaps even in this brief survey it may be proper not wholly to pass over the question whether, in the changes which the Universities have gone through during the last fifty years, the higher forms of individual mental activity have become more or less common, and more or less vigorous, than they were before. Genius indeed baffles pursuit; but in the energies which, while they fall short of genius, are yet inferior to this alone, the influence of surrounding conditions is usually to be traced, and we can distinguish to some extent the circumstances which have strengthened or impaired their development. Ineffective as the Universities were at the beginning of this reign, they were certainly not wanting in men of note. There appear to have existed both at Oxford and Cambridge groups, numerically small, within which the contact of mind with mind was vivid, incessant, and stimulating. The best men were, as a rule, little occupied with education; they had time to think and to read; and their very superiority to the ignorant herd about them gave them a certain daring and confidence in themselves. They were original rather than learned; and after the long torpor that had preceded them, they threw themselves with a certain youthful fervour into the speculation, the theology, the literature of their own new world. Among those who have grown up under the

reformed conditions of University life, who are at once more indebted to an educational system and more absorbed in it, this strong individual power seems to be rarer. There is abundant industry, but little of great merit is produced. Most of the work that will outlive our own time is the work of men now old, or nearing old age; the generation last risen to manhood at the Universities has not to any great extent risen above what may be called a high general average of performance, either literary or scientific. One cause of this is probably to be found in the predominance of merely educational aims and interests, and the excessive labour and attention given to the training and supervision of pupils, which in some Colleges is carried to an extent injurious to the pupils themselves. Time is consumed in endless alterations and readjustment of the educational machinery, which may perhaps, in a time of transition, be unavoidable, but which to an outsider appear unspeakably trivial and barren. Oxford in especial is familiar with careers of great promise which have ended in little more than a bustling about from one committee room to another and a round of attendance upon Boards of Studies. It would seem too as if death had robbed both Universities of an unusually large share of those who would have been their strength in our own day. In Clifford and Balfour the scientific interests of Cambridge had representatives whose worth was known far beyond its own schools; in Professor T. H. Green, Oxford lost a man of true philosophic genius and nobly impressive character. That successors worthy of these and of others whose loss is but too severely felt may not be wanting to the Universities in the immediate future, is the earnest desire of those to whom their best interests are dear.

This notice of the older Universities may be concluded by the bare mention—our space allows no more—of three

important movements by which they are now extending the sphere of their action.

Local examinations.

1. The system of local examinations, conducted by a University Board, by which every school in the kingdom can get a test of the efficiency of its work and the progress of its scholars. Though this system is far from supplying the place of a proper organisation of secondary instruction, it gives a test and a stimulus to many thousands of boys and girls of the middle classes every year. The Oxford and Cambridge Schools Examination Board, a later foundation, does similar work for the higher schools.

University Extension.

2. The so-called University Extension, an ill-chosen name for courses of lectures given by members of the Universities in populous places. These lectures are, especially in the north of England, awakening great interest among the working classes, who will sometimes walk miles to attend them. The lecturers also give advice as to the books that should be read, and otherwise endeavour to open to men of labour the world of intellectual interests.

Education of women.

3. The education of women. While at the London University women may take degrees, both at Oxford and Cambridge lectures are given to which women are admitted. They may enter for several of the examinations of the Universities, though they may not take degrees. Colleges and Halls for women-students have been established at both places; and Girton and Newnham, Somerville and Lady Margaret, have become flourishing institutions.

The University of London.

We must now pass on to the University of London. It was in the reign of George IV. that the project was formed, by Brougham, Campbell, and others, of establishing in London an institution where the highest education should be attainable, and where the theological restrictions which excluded whole classes from the older Universities should not exist. Capital was raised by the issue of shares;

a site in Gower Street was purchased, and the building now known as University College was opened in 1828 to students in Arts, Law, and Medicine. In order to keep entirely free from theological difficulties, instruction was not given in divinity, nor were religious services held. So far the undertaking had been a private one; it was now, however, determined to apply to the Crown for the power of granting degrees, except in theology. Great opposition to this was raised by the College of Surgeons and other corporate bodies as well as by the Universities; and it was not until the year 1835 that an address was carried in the House of Commons praying the Crown to grant the charter which was sought by the association. In the mean time King's College, London, had been founded, in order to supply, on the principles of the Church of England, the religious instruction and offices which were wanting at Gower Street. Having regard to the interests of this institution as well as to other circumstances, Lord Melbourne's Ministry decided that it would be better to create a distinct corporate body to fulfil the functions of a University in examining and conferring degrees, while affiliating to it the two rival Colleges and many other institutions throughout the kingdom. This view was accepted by the original association, which received its own separate charter as London University College, and has continued from that time to be a teaching institution. The University of London, as designed by the Government, was incorporated by a charter authorising thirty-six distinguished persons therein named to act as a Board for conferring degrees, after examination, in all subjects except divinity. There was attached to the charter a list of affiliated Colleges—that is, of institutions whose students might present themselves for examination. It was not intended that the mere capacity to pass an examination should entitle any person to receive a degree

London University made distinct from Londo University College.

from the University: a course of previous systematic education was required at one of the affiliated Colleges, in the list of which it was intended that additional ones should from time to time be included.

The University of London from 1837 to 1887.

The first year of Queen Victoria saw the first examinations conducted by the University of London, and for the next twenty years its operations continued on the lines marked out by the original charter. Its headquarters, after some migrations, were fixed at Burlington House. In 1858 an important change took place. The restriction of the right of obtaining degrees to students educated at the affiliated Colleges excluded hundreds of meritorious persons who had studied privately or in other schools; and it was moreover found that the certificate of the privileged Colleges was in some cases given on the strength of a merely nominal membership. It was therefore determined that the existing limitations should be removed, and the examinations of the University be thrown open to all the world, with the sole exception that medical candidates were required to have passed through one of the recognised schools of their profession. The effect of this change was very great. The number of candidates presenting themselves increased beyond all expectation, rising, between the years 1858 and 1885, in the case of the matriculation examination, from 299 to 1,900, and in the B.A. examination from 72 to 339. Moreover, through the abolition of the system of affiliation, the University gained a general influence over all the schools in the kingdom. Its matriculation test, which was far severer and far broader in its requirements than that of most of the Colleges at Oxford and Cambridge, became recognised as a standard of proficiency not only in the educational world itself, but in the entrance to various professions and callings. It became therefore, instead of a mere preliminary to the other examinations in the University of

London, a sort of certificate, qualifying the youth who was leaving school for admission to the career that might lie before him, and it thus enabled the University of London to influence school education more powerfully than it could ever have done if those alone had presented themselves for the first examination who intended subsequently to proceed to degrees. The system of local examination now established by Oxford and Cambridge has, from this point of view, been no more than an enlargement and generalisation of the work originally performed by London. It may be added that since 1883 all London examinations and degrees have been open to men and women on equal terms.

London University as an examining body.

When a University has but one function to fulfil, the only question that can be asked about it is whether it fulfils this function well. As an examining body, the University of London, though it has received much criticism, far surpasses Oxford and Cambridge. It is better in the preliminaries, and it is better at every stage upwards from these to the highest. The mass of men who, in the absence of any matriculation test imposed by the older Universities themselves, gain admission to the inferior Colleges, would certainly be discomfited if they were to present themselves for matriculation at Burlington House. The graduate of Oxford or Cambridge who, after taking his B.A. degree, is allowed to proceed without any further examination, and on the mere payment of successive fees, to the Master's degree, would be horrified to find that at London he must pass an examination of increasing severity at each step upwards. Not that there is occasion to attribute to the newer University any innate intellectual or moral superiority over its elders. It can no more suffer from the peculiar infirmities of Oxford and Cambridge than a skeleton can suffer from gout. The true time for comparison will not arrive until in London the examining body becomes, as elsewhere,

identical with the teaching body, or dominated by it. There is, indeed, something chilling and forlorn in the spectacle of a University which offers no training of its own, which gathers to it no glad troops of youth, which is the home of no one learned man, which ceases even to have any concrete existence between the recurring throes of examination. The project of making the University of London not only an examining but a teaching body has naturally arisen among some of the worthiest of its members. This project is as yet scarcely before the public. In its realisation the one thing to be feared will be the imperilment of that absolute freedom from all corporate, local, and financial interests which has up to this time given to the University of London, in spite of all defects, the authority of an intellectual tribunal, and made it in its influence upon education a national power.

The Victoria University.

It remains for us, passing over the not very eventful chronicles of Durham, to add a brief notice of the Victoria University, which has just risen in full orb above the busy homes of industry in the North-West. Plans for the establishment of a system of higher education had been made at Manchester from time to time since the end of the last century; but little resulted from these until, in the year 1846, Mr. John Owens, a merchant of that city, bequeathed property amounting to about 100,000*l.* for the endowment of a College at Manchester which should furnish instruction in all the branches of science and learning usually taught in the English Universities. The college was opened in 1851. For the first seven years its prospects were not hopeful. Its standard of education, it was said, was too high; it supplied something for which there existed no demand in Manchester; if students were to be obtained, it must be reduced to the level of an ordinary school. Against these suggestions of faint-heartedness the trustees and the

Foundation and expansion of Owens College.

staff of the College remained firm. Convinced that the existence of a place of liberal education in the midst of a vast commercial and manufacturing industry would sooner or later make the need of a liberal education felt, they applied themselves with admirable perseverance and sagacity to the correction of what was amiss in their work, to the improvement of their organisation, to the study and introduction of new means of serving the public and fulfilling the large design of their founder. The reward came in due time. From the year 1860 the number of students steadily increased. Manchester began to take an interest and a pride in its College; and in a few more years such was the growth both in the educational work itself and in the confidence of its friends that the existing buildings were condemned as totally insufficient, and an appeal was made to the public for 150,000*l.* in order that buildings adequate to the needs of the College might be constructed. The Natural History Society and the Medical School of Manchester negotiated for an amalgamation with the College; and with a just sense of the great future now opening out it was determined by the friends of higher education to introduce into Parliament a measure enlarging Mr. Owens' trust, which had hitherto been in private hands, into a great public corporation, suitable at some future time to occupy the position of a University for the North of England. The Bill was carried through Parliament; the new corporate body, still keeping the first founder's name, succeeded to the trustees; the refusal of two successive Governments to assist the work from the public funds only stimulated local generosity and zeal. Donations of ample magnitude poured in; and on October 7, 1873, the new buildings were thrown open. The work of the College now expanded in every direction. Scarcely was one professorship founded than another was seen to be necessary; and, in spite of repeated

moments of financial pressure, there has seemed to be a noble contest between the College and the public, which should ask and which should give the most. At length, in the year 1878, the charter of a University, with power of granting degrees, was sought. Opposition was made by the Yorkshire College at Leeds to that part of the scheme which limited the University to a single College and gave to it the name of a Lancashire town. In deference to the just pride of Yorkshire, it was accordingly determined by Government that the University should bear no local name, but that of Victoria, and that the right of admission should remain open to such other Colleges as might thereafter satisfy the requirements of the charter. Owens College was recognised as the centre and headquarters of the University; and although it has found one companion in University College, Liverpool, it need fear no rivalry in its position as intellectual centre of the North of England. Its foundation has done honour to all who have borne part in it, and will rank high among the educational efforts that cast a lustre on this reign. If in the older studies it may still yield the palm to Oxford and Cambridge, an unbounded future lies before it as the home of a great medical school, and as the natural training place of those who shall carry into the manufacturing and the mining industries of England not only the results of the latest scientific discovery, but the larger and more liberal habit of mind which it is the aim of all true University education to impart.

University charter granted, 1880.

Character of the Scotch Universities.

No greater contrast can be imagined than that which at the beginning of this century existed between the Scotch and the English Universities. In Scotland the Universities were essentially popular institutions. They were not ecclesiastical bodies, nor framed mainly for the education of the clergy. They had in no respect been organised or modified with reference to the means, or pursuits, or habits of the

aristocracy. Their system was that of a general plan of education by means of professors' lectures, at which students of every rank of life could attend, without being required to enter any collegiate body, or to submit themselves to any discipline outside the class-room, or even to profess any intention of going through a regular course of study or proceeding to a degree. The Universities included students of every variety and description: men advanced in life, who attended some of the classes for amusement, or to recall the studies of early years, or to improve themselves in professional education originally interrupted; persons engaged in manufacture or industry, who expected to derive aid in their pursuits from new applications of science to the arts; young men not intended for any learned profession, or even for a regular course of University education, but sent for one or more years to College in order to carry their education farther than that of the schools before their entry into practical life. All persons might attend any of the classes in whatever order or manner might suit their own views or inclinations; and so thoroughly popular and national were the Universities that, in families of the middle ranks of life, it was a common, if not indeed a usual, thing for one or more of the sons to go to College for a longer or a shorter time; while even from the humblest homes poor lads would make their way to the classes of Dugald Stewart or Chalmers after they had finished labouring with their fathers in the harvest-field.

They were higher schools for the people.

The Scotch Universities were in fact higher schools for the people rather than seats of advanced study. Not that their best men were inferior to those of the English Universities; on the contrary, they far surpassed them. But there existed the apparent anomaly of professors of European reputation engaged in giving instruction to boys of fifteen, and to persons who, though older, had the rudiments

of their subjects to learn. Double and incompatible objects were imposed upon the Scotch Universities by the absence of a system of upper or intermediate schools. They had at once, with extremely insufficient resources, to educate a troop of schoolboys, and, as Universities, to keep up a high level in their philosophy and scholarship. Their educational work was imperfectly performed because the professor was without assistants, and might have hundreds of lads in his class. In some subjects, as in Greek, the low attainments of the pupils necessarily dragged the teacher down; in others, as in philosophy, the teacher might keep to his own level, but, though he might then inspire, he could hardly train or discipline the minds of his pupils. Great as was the work effected by the Scotch Universities in raising the general intelligence and mental tone of the nation, it was impossible for them to be seats of learning on a large scale, as Oxford and Cambridge, supported by the public schools of England, might and ought to have been. The Medical School of Edinburgh, which rose to eminence during the eighteenth century, was perhaps that department in which high scientific knowledge and a thorough system of instruction were most happily combined.

Absence of a complete course of study.

When, in the third decade of this century, public attention was directed to certain defects of the Scotch Universities, no one denied the great and substantial services they were rendering; no one thought of comparing their shortcomings with the gross and crying abuses of Oxford and Cambridge. It was, however, seen that their whole system was too loose and superficial. Without excluding from the classes persons who had come only for a short period, it was still possible that there should be a systematic course of study for those who could go through it, and that the Universities should exercise functions beyond the mere providing of public lectures. In consequence of the degree in

Arts not being necessary for persons entering into the Scotch ministry, this degree had in the last century become almost obsolete. Candidates went through the prescribed attendance at lectures, and received a certificate, beyond which nothing was required. Degrees in Arts were occasionally conferred by the Universities on the request of persons desirous to have them, or as matter of compliment; but there was no examination, nor was the degree itself held in any repute. Thus there was nothing in the regulations of the Universities to enforce any complete course of study, nor, in the case of a student who had gone through it, was there anything to connect him with the University in his future life, unless he actually became a professor. The absence of fellowships and other rewards for learning was indeed a misfortune which only the liberality of founders and benefactors could remedy; but even without these endowments the Universities might establish degree-examinations and confer distinctions upon those who passed them most successfully. Courses of study might be defined; and by a change in constitution the whole body of graduates of each University might be granted such share in its government and privileges that the attainment of a degree would become, as in England, an object of desire.

Report of Commission, 1831.

All this was pointed out in the report of a Commission on the Scotch Universities which was presented to Parliament in 1831. A measure based on the report of this Commission was introduced by Lord Melbourne in 1837, but it encountered strong opposition and was dropped. The disruption of the Established Church of Scotland in 1843, and the reform of the English Universities, subsequently revived public interest in the matter; and in 1858 the Government of Lord Palmerston resumed the work that had been broken off twenty-one years before. A Bill was carried through Parliament which gave to each of the four

Legislation of 1858.

Scotch Universities the same general constitution, and appointed a Commission to draw up the necessary statutes and ordinances for their internal organisation, keeping in view the recommendations made in the report of 1831. The governing body of each University, except in the case of Edinburgh, had hitherto been composed of the principal and professors, an arrangement of great simplicity, but one which had defects in working. These learned persons had not always been free from causes of contention with one another, and at Glasgow they appear to have administered the College property very injudiciously. It was now resolved by Parliament, in conformity with the views of the first Commission, that in each University, while the principal and professors, under the title of Senatus Academicus, transacted all ordinary business, their decisions should be subject to the review of a University Court, consisting of the Rector and certain assessors, nominated in part by the professors, but not selected from their body. The graduates were to form the General Council of each University, a body entitled to be consulted on certain matters by the Senatus and the Court, and vested with the right of electing the Chancellor. The election of the Rector was given to the students, partly on the ground that there ought to be some direct representation of the students' interests on the University Court, and partly from a generous belief that the students would be benefited by the presence among them at least once in the year of the eminent person on whom they might set their choice. The Rectorial addresses have made this part of the new constitution of the Scottish Universities familiar to thousands to whom the very name of the Senatus Academici and General Councils created by the same Act are unknown.

Changes after 1858.

The Legislature had thus drawn up certain constitutional outlines; it remained for the executive Commission of 1858

to recast the internal system and organisation of the Scotch Universities; to arrange their courses of study; to institute their examinations for degrees, where those had not been in the mean time instituted by the Universities themselves; and generally, while keeping in view the peculiar function of the Scotch Universities in offering, as it were, open house to every one, of whatever age or condition, possessed of an appetite for learning, to provide the best possible entertainment and the completest possible service for those who were to be not the casual visitors but the inmates and hereafter the co-proprietors of the mansion. The work of the Commission appears to have been well done, and to have harmonised with the efforts already being made within the Universities themselves. The aims defined by the Reformers of 1831 have been in a great measure attained: instruction is greatly improved; degrees are far more sought; and not the least striking proof of the increased power and popularity of the Universities is seen in the endowments which they are now year by year receiving from the generosity of individuals.

In this respect England and Scotland tell indeed the same tale. In the early days of University reform, it was the stock argument of the opponents of State interference that endowments would no more be forthcoming if founders' wills were overruled. Never has experience more convincingly declared in favour of common sense against folly. The stream of public liberality, scarcely trickling at the beginning of the century, now seems to be swelling to the goodly dimensions of olden times; and the thirty years that have passed since Parliament laid its reforming hand upon the Universities of Great Britain have brought to them ampler gifts and more important new foundations than the two preceding centuries.

C. A. FYFFE.

SCIENCE.

Recent industrial progress

THE most obvious and the most distinctive feature of the History of Civilisation, during the last fifty years, is the wonderful increase of industrial production by the application of machinery, the improvement of old technical processes and the invention of new ones, accompanied by an even more remarkable development of old and new means of locomotion and intercommunication. By this rapid and vast multiplication of the commodities and conveniences of existence, the general standard of comfort has been raised; the ravages of pestilence and famine have been checked; and the natural obstacles, which time and space offer to mutual intercourse, have been reduced in a manner, and to an extent, unknown to former ages. The diminution or removal of local ignorance and prejudice, the creation of common interests among the most widely separated peoples, and the strengthening of the forces of the organisation of the commonwealth against those of political or social anarchy, thus effected, have exerted an influence on the present and future fortunes of mankind the full significance of which may be divined, but cannot, as yet, be estimated at its full value.

caused by the increase of physical science.

This revolution—for it is nothing less—in the political and social aspects of modern civilisation has been preceded, accompanied, and in great measure caused, by a less obvious, but no less marvellous, increase of natural know-

ledge, and especially of that part of it which is known as Physical Science, in consequence of the application of scientific method to the investigation of the phenomena of the material world. Not that the growth of physical science is an exclusive prerogative of the Victorian age. Its present strength and volume merely indicate the highest level of a stream which took its rise, alongside of the primal founts of Philosophy, Literature, and Art, in ancient Greece; and, after being dammed up for a thousand years, once more began to flow three centuries ago.

Greek and mediæval science.

It may be doubted if even-handed justice, as free from fulsome panegyric as from captious depreciation, has ever yet been dealt out to the sages of antiquity who, for eight centuries, from the time of Thales to that of Galen, toiled at the foundations of physical science. But, without entering into the discussion of that large question, it is certain that the labours of these early workers in the field of natural knowledge were brought to a standstill by the decay and disruption of the Roman Empire, the consequent disorganisation of society, and the diversion of men's thoughts from sublunary matters to the problems of the supernatural world suggested by Christian dogma in the Middle Ages. And, notwithstanding sporadic attempts to recall men to the investigation of nature, here and there, it was not until the fifteenth and sixteenth centuries that physical science made a new start, founding itself, at first, altogether upon that which had been done by the Greeks. Indeed, it must be admitted that the men of the Renaissance, though standing on the shoulders of the old philosophers, were a long time before they saw as much as their forerunners had done.

The first serious attempts to carry further the unfinished work of Archimedes, Hipparchus, and Ptolemy, of Aristotle and of Galen, naturally enough arose among

the astronomers and the physicians. For the imperious necessity of seeking some remedy for the physical ills of life had insured the preservation of more or less of the wisdom of Hippocrates and his successors; and, by a happy conjunction of circumstances, the Jewish and the Arabian physicians and philosophers escaped many of the influences which, at that time, blighted natural knowledge in the Christian world. On the other hand, the superstitious hopes and fears which afforded countenance to astrology and to alchemy also sheltered astronomy and the germs of chemistry. Whether for this, or for some better reason, the founders of the schools of the Middle Ages included astronomy, along with geometry, arithmetic, and music, as one of the four branches of advanced education; and, in this respect, it is only just to them to observe that they were far in advance of those who sit in their seats. The schoolmen considered no one to be properly educated unless he were acquainted with, at any rate, one branch of physical science. We have not, even yet, reached that stage of enlightenment.

Further advance after Renaissance.

In the early decades of the seventeenth century, the men of the Renaissance could show that they had already put out to good interest the treasure bequeathed to them by the Greeks. They had produced the astronomical system of Copernicus, with Kepler's great additions; the astronomical discoveries and the physical investigations of Galileo; the mechanics of Stevinus and the 'De Magnete' of Gilbert; the anatomy of the great French and Italian schools and the physiology of Harvey. In Italy, which had succeeded Greece in the hegemony of the scientific world, the Accademia dei Lyncei and sundry other such associations for the investigation of nature, the models of all subsequent academies and scientific societies, had been founded; while the literary skill and biting wit of Galileo had made

the great scientific questions of the day not only intelligible, but attractive, to the general public.

Francis Bacon.

In our own country, Francis Bacon had essayed to sum up the past of physical science, and to indicate the path which it must follow if its great destinies were to be fulfilled. And though the attempt was just such a magnificent failure as might have been expected from a man of great endowments, who was so singularly devoid of scientific insight that he could not understand the value of the work already achieved by the true instaurators of physical science; yet the majestic eloquence and the fervid vaticinations of one who was conspicuous alike by the greatness of his rise and the depth of his fall, drew the attention of all the world to the 'new birth of Time.'

The defect of his method.

But it is not easy to discover satisfactory evidence that the 'Novum Organum' had any direct beneficial influence on the advancement of natural knowledge. No delusion is greater than the notion that method and industry can make up for lack of motherwit, either in science or in practical life; and it is strange that, with his knowledge of mankind, Bacon should have dreamed that his, or any other, 'via inveniendi scientias' would 'level men's wits' and leave little scope for that inborn capacity which is called genius. As a matter of fact, Bacon's 'via' has proved hopelessly impracticable; while the 'anticipation of nature' by the invention of hypotheses based on incomplete inductions, which he specially condemns, has proved itself to be a most efficient, indeed an indispensable, instrument of scientific progress. Finally, that transcendental alchemy—the superinducement of new forms on matter—which Bacon declares to be the supreme aim of science, has been wholly ignored by those who have created the physical knowledge of the present day.

Even the eloquent advocacy of the Chancellor brought

no unmixed good to physical science. It was natural enough that the man who, in his better moments, took 'all knowledge for his patrimony,' but, in his worse, sold that birthright for the mess of pottage of Court favour and professional success, for pomp and show, should be led to attach an undue value to the practical advantages which he foresaw, as Roger Bacon and, indeed, Seneca had foreseen, long before his time, must follow in the train of the advancement of natural knowledge. The burden of Bacon's pleadings for science is the 'gathering of fruit'—the importance of winning solid material advantages by the investigation of Nature and the desirableness of limiting the application of scientific methods of inquiry to that field.

Hobbes.

Bacon's younger contemporary, Hobbes, casting aside the prudent reserve of his predecessor in regard to those matters about which the Crown or the Church might have something to say, extended scientific methods of inquiry to the phenomena of mind and the problems of social organisation; while, at the same time, he indicated the boundary between the province of real, and that of imaginary, knowledge. The 'Principles of Philosophy' and the 'Leviathan' embody a coherent system of purely scientific thought in language which is a model of clear and vigorous English style. At the same time, in France, a man of far greater scientific capacity than either Bacon or Hobbes, René Descartes, not only in his immortal 'Discours de la Méthode' and elsewhere, went down to the foundations of scientific certainty, but, in his 'Principes de Philosophie,' indicated where the goal of physical science really lay. However, Descartes was an eminent mathematician, and it would seem that the bent of his mind led him to overestimate the value of deductive reasoning from general principles, as much as Bacon had underestimated it. The progress of physical science has been effected neither by Baconians nor

Des cartes.

by Cartesians, as such, but by men like Galileo and Harvey, Boyle and Newton, who would have done their work just as well if neither Bacon nor Descartes had ever propounded their views respecting the manner in which scientific investigation should be pursued.

For a time the progress without 'fruits.'

The progress of science, during the first century after Bacon's death, by no means verified his sanguine prediction of the fruits which it would yield. For, though the revived and renewed study of nature had spread and grown to an extent which surpassed reasonable expectation, the practical results—the 'good to men's estate'—were, at first, by no means apparent. Sixty years after Bacon's death, Newton had crowned the long labours of the astronomers and the physicists, by co-ordinating the phenomena of molar motion throughout the visible universe into one vast system; but the 'Principia' helped no man to either wealth or comfort. Descartes, Newton, and Leibnitz had opened up new worlds to the mathematician, but the acquisitions of their genius enriched only man's ideal estate. Descartes had laid the foundations of rational cosmogony and of physiological psychology; Boyle had produced models of experimentation in various branches of physics and chemistry; Pascal and Torricelli had weighed the air; Malpighi and Grew, Ray and Willoughby had done work of no less importance in the biological sciences; but weaving and spinning were carried on with the old appliances; nobody could travel faster by sea or by land than at any previous time in the world's history, and King George could send a message from London to York no faster than King John might have done. Metals were worked from their ores by immemorial rule of thumb, and the centre of the iron trade of these islands was still among the oak forests of Sussex. The utmost skill of our mechanicians did not get beyond the production of a coarse watch.

The middle of the eighteenth century is illustrated by a host of great names in science—English, French, German, and Italian—especially in the fields of chemistry, geology, and biology; but this deepening and broadening of natural knowledge produced next to no immediate practical benefits. Even if, at this time, Francis Bacon could have returned to the scene of his greatness and of his littleness, he must have regarded the philosophic world which praised and disregarded his precepts with great disfavour. If ghosts are consistent, he would have said, 'These people are all wasting their time, just as Gilbert and Kepler and Galileo and my worthy physician Harvey did in my day. Where are the fruits of the restoration of science which I promised? This accumulation of bare knowledge is all very well, but *cui bono?* Not one of these people is doing what I told him specially to do, and seeking that secret of the cause of forms which will enable men to deal, at will, with matter, and superinduce new natures upon the old foundations.'

Its recent effect on life.

But, a little later, that growth of knowledge beyond imaginable utilitarian ends, which is the condition precedent of its practical utility, began to produce some effect upon practical life; and the operation of that part of nature we call human upon the rest began to create, not 'new natures,' in Bacon's sense, but a new Nature, the existence of which is dependent upon men's efforts, which is subservient to their wants, and which would disappear if man's shaping and guiding hand were withdrawn. Every mechanical artifice, every chemically pure substance employed in manufacture, every abnormally fertile race of plants, or rapidly growing and fattening breed of animals, is a part of the new Nature created by science. Without it, the most densely populated regions of modern Europe and America must retain their primitive, sparsely inhabited, agricultural or

pastoral condition; it is the foundation of our wealth and the condition of our safety from submergence by another flood of barbarous hordes; it is the bond which unites into a solid political whole, regions larger than any empire of antiquity; it secures us from the recurrence of the pestilences and famines of former times; it is the source of endless comforts and conveniences, which are not mere luxuries, but conduce to physical and moral well-being. During the last fifty years, this new birth of time, this new Nature begotten by science upon fact, has pressed itself daily and hourly upon our attention, and has worked miracles which have modified the whole fashion of our lives.

These results often too much regarded;

What wonder, then, if these astonishing fruits of the tree of knowledge are too often regarded by both friends and enemies as the be-all and end-all of science? What wonder if some eulogise, and others revile, the new philosophy for its utilitarian ends and its merely material triumphs?

for scientific research

In truth, the new philosophy deserves neither the praise of its eulogists, nor the blame of its slanderers. As I have pointed out, its disciples were guided by no search after practical fruits, during the great period of its growth, and it reached adolescence without being stimulated by any rewards of that nature. The bare enumeration of the names of the men who were the great lights of science in the latter part of the eighteenth and the first decade of the nineteenth century, of Herschel, of Laplace, of Young, of Fresnel, of Oersted, of Cavendish, of Lavoisier, of Davy, of Lamarck, of Cuvier, of Jussieu, of Decandolle, of Werner and of Hutton, suffices to indicate the strength of physical science in the age immediately preceding that of which I have to treat. But of which of these great men can it be said that their labours were directed to practical ends? I do not call to mind even an invention of practical utility which we owe to any of them, except the safety-lamp of Davy. Werner

rarely directed to practical ends,

certainly paid attention to mining, and I have not forgotten James Watt. But, though some of the most important of the improvements by which Watt converted the steam-engine, invented long before his time, into the obedient slave of man, were suggested and guided by his acquaintance with scientific principles, his skill as a practical mechanician and the efficiency of Bolton's workmen had quite as much to do with the realisation of his projects.

but instigated by love of knowledge.

In fact, the history of physical science teaches (and we cannot too carefully take the lesson to heart) that the practical advantages, attainable through its agency, never have been, and never will be, sufficiently attractive to men inspired by the inborn genius of the interpreter of nature, to give them courage to undergo the toils and make the sacrifices which that calling requires from its votaries. That which stirs their pulses is the love of knowledge and the joy of the discovery of the causes of things sung by the old poets—the supreme delight of extending the realm of law and order ever farther towards the unattainable goals of the infinitely great and the infinitely small, between which our little race of life is run. In the course of this work, the physical philosopher, sometimes intentionally, much more often unintentionally, lights upon something which proves to be of practical value. Great is the rejoicing of those who are benefited thereby; and, for the moment, science is the Diana of all the craftsmen. But, even while the cries of jubilation resound and this flotsam and jetsam of the tide of investigation is being turned into the wages of workmen and the wealth of capitalists, the crest of the wave of scientific investigation is far away on its course over the illimitable ocean of the unknown.

Far be it from me to depreciate the value of the gifts of science to practical life, or to cast a doubt upon the propriety of the course of action of those who follow science

in the hope of finding wealth alongside truth, or even wealth alone. Such a profession is as respectable as any other. And quite as little do I desire to ignore the fact that, if industry owes a heavy debt to science, it has largely repaid the loan by the important aid which it has, in its turn, rendered to the advancement of science. In considering the causes which hindered the progress of physical knowledge in the schools of Athens and of Alexandria, it has often struck me [1] that where the Greeks did wonders was in just those branches of science, such as geometry, astronomy, and anatomy, which are susceptible of very considerable development without any, or any but the simplest, appliances. It is a curious speculation to think what would have become of modern physical science if glass and alcohol had not been easily obtainable; and if the gradual perfection of mechanical skill for industrial ends had not enabled investigators to obtain, at comparatively little cost, microscopes, telescopes, and all the exquisitely delicate apparatus for determining weight and measure and for estimating the lapse of time with exactness, which they now command. If science has rendered the colossal development of modern industry possible, beyond a doubt industry has done no less for modern physics and chemistry, and for a great deal of modern biology. And as the captains of industry have, at last, begun to be aware that the condition of success in that warfare, under the forms of peace, which is known as industrial competition lies in the discipline of the troops and the use of arms of precision, just as much as it does in the warfare which is called war, their demand for that discipline, which is technical education, is reacting upon science in a manner which will, assuredly, stimulate its

It is, in its turn, assisted by industrial improvements.

[1] There are excellent remarks to the same effect in Zeller's *Philosophie der Griechen*, Theil II. Abth. ii. p. 407, and in Eucken's *Die Methode der Aristotelischen Forschung*, pp. 138 *et seq.*

future growth to an incalculable extent. It has become obvious that the interests of science and of industry are identical; that science cannot make a step forward without, sooner or later, opening up new channels for industry; and, on the other hand, that every advance of industry facilitates those experimental investigations, upon which the growth of science depends. We may hope that, at last, the weary misunderstanding between the practical men who professed to despise science, and the high and dry philosophers who professed to despise practical results, is at an end.

Nevertheless, that which is true of the infancy of physical science in the Greek world, that which is true of its adolescence in the seventeenth and eighteenth centuries, remains true of its riper age in these latter days of the nineteenth century. The great steps in its progress have been made, are made, and will be made, by men who seek knowledge simply because they crave for it. They have their weaknesses, their follies, their vanities, and their rivalries, like the rest of the world; but, whatever by-ends may mar their dignity and impede their usefulness, this chief end redeems them.[1] Nothing great in science has ever been done by men, whatever their powers, in whom the divine afflatus of the truth-seeker was wanting. Men of moderate capacity have done great things because it

[1] Fresnel, after a brilliant career of discovery in some of the most difficult regions of physico-mathematical science, died at thirty-nine years of age. The following passage of a letter from him to Young (written in November 1824), quoted by Whewell, so aptly illustrates the spirit which animates the scientific inquirer that I may cite it:

'For a long time that sensibility, or that vanity, which people call love of glory is much blunted in me. I labour much less to catch the suffrages of the public than to obtain an inward approval which has always been the mental reward of my efforts. Without doubt I have often wanted the spur of vanity to excite me to pursue my researches in moments of disgust and discouragement. But all the compliments which I have received from MM. Arago, De Laplace, or Biot, never gave me so much pleasure as the discovery of a theoretical truth or the confirmation of a calculation by experiment.'

animated them; and men of great natural gifts have failed, absolutely or relatively, because they lacked this one thing needful.

True aim and method of research.

To anyone who knows the business of investigation practically, Bacon's notion of establishing a company of investigators to work for 'fruits,' as if the pursuit of knowledge were a kind of mining operation and only required well-directed picks and shovels, seems very strange.[1] In science, as in art, and, as I believe, in every other sphere of human activity, there may be wisdom in a multitude of counsellors, but it is only in one or two of them. And, in scientific inquiry, at any rate, it is to that one or two that we must look for light and guidance. Newton said that he made his discoveries by 'intending' his mind on the subject; no doubt truly. But to equal his success one must have the mind which he 'intended.' Forty lesser men might have intended their minds till they cracked, without any like result. It would be idle either to affirm or to deny that the last half-century has produced men of science of the calibre of Newton. It is sufficient that it can show a few capacities of the first rank, competent not only to deal profitably with the inheritance bequeathed by their scientific forefathers, but to pass on to their successors physical truths of a higher order than any yet reached by the human race. And if they have succeeded as Newton succeeded, it is because they have sought truth as he sought it, with no other object than the finding it.

Progress from 1837 to 1887.

I am conscious that in undertaking to give even the briefest sketch of the progress of physical science, in all its branches, during the last half-century, I may be thought to

[1] 'Mémorable exemple de l'impuissance des recherches collectives appliquées à la découverte des vérités nouvelles!' says one of the most distinguished of living French *savants*, of the corporate chemical work of the old Académie des Sciences. (See Berthelot, *Science et Philosophie*, p. 201.)

have exhibited more courage than discretion, and perhaps more presumption than either. So far as physical science is concerned, the days of Admirable Crichtons have long been over, and the most indefatigable of hard workers may think he has done well if he has mastered one of its minor subdivisions. Nevertheless, it is possible for anyone, who has familiarised himself with the operations of science in one department, to comprehend the significance, and even to form a general estimate of the value, of the achievements of specialists in other departments.

Nor is there any lack either of guidance, or of aids to ignorance. By a happy chance, the first edition of Whewell's 'History of the Inductive Sciences' was published in 1837, and it affords a very useful view of the state of things at the commencement of the Victorian epoch. As to subsequent events, there are numerous excellent summaries of the progress of various branches of science, especially up to 1881, which was the jubilee year of the British Association.[1] And, with respect to the biological sciences, with some parts of which my studies have familiarised me, my personal experience nearly coincides with the preceding half-century. I may hope, therefore, that my chance of escaping serious errors is as good as that of anyone else, who might have been persuaded to undertake the somewhat perilous enterprise in which I find myself engaged.

There is yet another prefatory remark which it seems desirable I should make. It is that I think it proper to confine myself to the work done, without saying anything about the doers of it. Meddling with questions of merit and priority is a thorny business at the best of times, and, unless

[1] I am particularly indebted to my friend and colleague Professor Rücker, F.R.S., for the many acute criticisms and suggestions on my remarks respecting the ultimate problems of physics, with which he has favoured me, and by which I have greatly profited.

in case of necessity, altogether undesirable when one is dealing with contemporaries. No such necessity lies upon me; and I shall, therefore, mention no names of living men, lest, perchance, I should incur the reproof which the Israelites, who struggled with one another in the field, addressed to Moses—'Who made thee a prince and a judge over us?'

The aim of physical science,

Physical science is one and indivisible. Although, for practical purposes, it is convenient to mark it out into the primary regions of Physics, Chemistry, and Biology, and to subdivide these into subordinate provinces, yet the method of investigation and the ultimate object of the physical inquirer are everywhere the same.

the discovery of the rational order of the universe.

The object is the discovery of the rational order which pervades the universe; the method consists of observation and experiment (which is observation under artificial conditions) for the determination of the facts of nature; of inductive and deductive reasoning for the discovery of their mutual relations and connection. The various branches of physical science differ in the extent to which, at any given moment of their history, observation on the one hand, or ratiocination on the other, is their more obvious feature, but in no other way; and nothing can be more incorrect than the assumption one sometimes meets with, that physics has one method, chemistry another, and biology a third.

It is based on postulates,

All physical science starts from certain postulates. One of them is the objective existence of a material world. It is assumed that the phenomena which are comprehended under this name have a 'substratum' of extended, impenetrable, mobile substance, which exhibits the quality known as inertia, and is termed matter.[1] Another postulate is

[1] I am aware that this proposition may be challenged. It may be said, for example, that, on the hypothesis of Boscovich, matter has no extension,

the universality of the law of causation; that nothing happens without a cause (that is, a necessary precedent condition), and that the state of the physical universe, at any given moment, is the consequence of its state at any preceding moment. Another is that any of the rules, or so-called 'laws of nature,' by which the relation of phenomena is truly defined, is true for all time. The validity of these postulates is a problem of metaphysics; they are neither self-evident nor are they, strictly speaking, demonstrable. The justification of their employment, as axioms of physical philosophy, lies in the circumstance that expectations logically based upon them are verified, or, at any rate, not contradicted, whenever they can be tested by experience.

and uses hypotheses.

Physical science therefore rests on verified or uncontradicted hypotheses; and, such being the case, it is not surprising that a great condition of its progress has been the invention of verifiable hypotheses. It is a favourite popular delusion that the scientific inquirer is under a sort of moral obligation to abstain from going beyond that generalisation of observed facts which is absurdly called 'Baconian' induction. But anyone who is practically acquainted with scientific work is aware that those who refuse to go beyond fact, rarely get as far as fact; and anyone who has studied the history of science knows that

being reduced to mathematical points serving as centres of 'forces.' But as the 'forces' of the various centres are conceived to limit one another's action in such a manner that an area around each centre has an individuality of its own, extension comes back in the form of that area. Again, a very eminent mathematician and physicist—the late Clerk Maxwell—has declared that impenetrability is not essential to our notions of matter, and that two atoms may conceivably occupy the same space. I am loth to dispute any dictum of a philosopher as remarkable for the subtlety of his intellect as for his vast knowledge; but the assertion that one and the same point or area of space can have different (conceivably opposite) attributes appears to me to violate the principle of contradiction, which is the foundation not only of physical science, but of logic in general. It means that A can be not-A.

almost every great step therein has been made by the 'anticipation of Nature,' that is, by the invention of hypotheses, which, though verifiable, often had very little foundation to start with; and, not unfrequently, in spite of a long career of usefulness, turned out to be wholly erroneous in the long run.

Fruitful use of an hypothesis even when wrong,

The geocentric system of astronomy, with its eccentrics and its epicycles, was an hypothesis utterly at variance with fact, which nevertheless did great things for the advancement of astronomical knowledge. Kepler was the wildest of guessers. Newton's corpuscular theory of light was of much temporary use in optics, though nobody now believes in it; and the undulatory theory, which has superseded the corpuscular theory and has proved one of the most fertile of instruments of research, is based on the hypothesis of the existence of an 'ether,' the properties of which are defined in propositions, some of which, to ordinary apprehension, seem physical antinomies.

It sounds paradoxical to say that the attainment of scientific truth has been effected, to a great extent, by the help of scientific errors. But the subject-matter of physical science is furnished by observation, which cannot extend beyond the limits of our faculties; while, even within those limits, we cannot be certain that any observation is absolutely exact and exhaustive. Hence it follows that any given generalisation from observation may be true, within the limits of our powers of observation at a given time, and yet turn out to be untrue, when those powers of observation are directly or indirectly enlarged. Or, to put the matter in another way, a doctrine which is untrue absolutely, may, to a very great extent, be susceptible of an interpretation in accordance with the truth. At a certain period in the history of astronomical science, the assumption that the planets move in circles was true enough to serve the purpose

of correlating such observations as were then possible; after Kepler, the assumption that they move in ellipses became true enough in regard to the state of observational astronomy at that time. We say still that the orbits of the planets are ellipses, because, for all ordinary purposes, that is a sufficiently near approximation to the truth; but, as a matter of fact, the centre of gravity of a planet describes neither an ellipse or any other simple curve, but an immensely complicated undulating line. It may fairly be doubted whether any generalisation, or hypothesis, based upon physical data is absolutely true, in the sense that a mathematical proposition is so; but, if its errors can become apparent only outside the limits of practicable observation, it may be just as usefully adopted for one of the symbols of that algebra by which we interpret nature, as if it were absolutely true.

The development of every branch of physical knowledge presents three stages which, in their logical relation, are successive. The first is the determination of the sensible character and order of the phenomena. This is *Natural History*, in the original sense of the term, and here nothing but observation and experiment avail us. The second is the determination of the constant relations of the phenomena thus defined, and their expression in rules or laws. The third is the explication of these particular laws by deduction from the most general laws of matter and motion. The last two stages constitute *Natural Philosophy* in its original sense. In this region, the invention of verifiable hypotheses is not only permissible, but is one of the conditions of progress.

and mutual assistance of observation, experiment, and

Historically, no branch of science has followed this order of growth; but, from the dawn of exact knowledge to the present day, observation, experiment, and speculation have gone hand in hand; and, whenever science has halted or strayed from the right path, it has been,

either because its votaries have been content with mere unverified or unverifiable speculation (and this is the commonest case, because observation and experiment are hard work, while speculation is amusing); or it has been, because the accumulation of details of observation has for a time excluded speculation. speculation.

The progress of physical science, since the revival of learning, is largely due to the fact that men have gradually learned to lay aside the consideration of unverifiable hypotheses; to guide observation and experiment by verifiable hypotheses; and to consider the latter, not as ideal truths, the real entities of an intelligible world behind phenomena, but as a symbolical language, by the aid of which nature can be interpreted in terms apprehensible by our intellects. And if physical science, during the last fifty years, has attained dimensions beyond all former precedent, and can exhibit achievements of greater importance than any former such period can show, it is because able men, animated by the true scientific spirit, carefully trained in the method of science, and having at their disposal immensely improved appliances, have devoted themselves to the enlargement of the boundaries of natural knowledge in greater number than during any previous half-century of the world's history. Recognition of these truths in recent times, and consequent progress.

I have said that our epoch can produce achievements in physical science of greater moment than any other has to show, advisedly; and I think that there are three great products of our time which justify the assertion. One of these is that doctrine concerning the constitution of matter which, for want of a better name, I will call 'molecular;' the second is the doctrine of the conservation of energy; the third is the doctrine of evolution. Each of these was foreshadowed, more or less distinctly, in former periods of the history of science; and, so far is either from being the The three great achievements. Doctrines of (1) molecular constitution of matter, (2) conservation of energy, (3) evolution.

outcome of purely inductive reasoning, that it would be hard to overrate the influence of metaphysical, and even of theological, considerations upon the development of all three. The peculiar merit of our epoch is that it has shown how these hypotheses connect a vast number of seemingly independent partial generalisations; that it has given them that precision of expression which is necessary for their exact verification; and that it has practically proved their value as guides to the discovery of new truth. All three doctrines are intimately connected, and each is applicable to the whole physical cosmos. But, as might have been expected from the nature of the case, the first two grew, mainly, out of the consideration of physico-chemical phenomena; while the third, in great measure, owes its rehabilitation, if not its origin, to the study of biological phenomena.

(1) Molecular constitution of matter.

In the early decades of this century, a number of important truths applicable, in part, to matter in general, and, in part, to particular forms of matter, had been ascertained by the physicists and chemists.

The laws of motion of visible and tangible, or *molar*, matter had been worked out to a great degree of refinement and embodied in the branches of science known as Mechanics, Hydrostatics, and Pneumatics. These laws had been shown to hold good, so far as they could be checked by observation and experiment, throughout the universe, on the assumption that all such masses of matter possessed inertia and were susceptible of acquiring motion, in two ways, firstly by impact, or impulse from without; and, secondly, by the operation of certain hypothetical causes of motion termed 'forces,' which were usually supposed to be resident in the particles of the masses themselves, and to operate at a distance, in such a way as to tend to draw any two such masses together, or to separate them more widely.

With respect to the ultimate constitution of these masses, the same two antagonistic opinions which had existed since the time of Democritus and of Aristotle were still face to face. According to the one, matter was discontinuous and consisted of minute indivisible particles or atoms, separated by a universal vacuum; according to the other, it was continuous, and the finest distinguishable, or imaginable, particles were scattered through the attenuated general substance of the plenum. A rough analogy to the latter case would be afforded by granules of ice diffused through water; to the former, such granules diffused through absolutely empty space.

The two theories as to matter.

In the latter part of the eighteenth century, the chemists had arrived at several very important generalisations respecting those properties of matter with which they were especially concerned. However plainly ponderable matter seemed to be originated and destroyed in their operations, they proved that, as mass or body, it remained indestructible and ingenerable; and that, so far, it varied only in its perceptibility by our senses. The course of investigation further proved that a certain number of the chemically separable kinds of matter were unalterable by any known means (except in so far as they might be made to change their state from solid to fluid, or *vice versâ*), unless they were brought into contact with other kinds of matter, and that the properties of these several kinds of matter were always the same, whatever their origin. All other bodies were found to consist of two or more of these, which thus took the place of the four 'elements' of the ancient philosophers. Further, it was proved that, in forming chemical compounds, bodies always unite in a definite proportion by weight, or in simple multiples of that proportion, and that, if any one body were taken as a standard, every other could have a number assigned to it as its proportional com-

Reassertion by Dalton of atomic theory.

bining weight. It was on this foundation of fact that Dalton based his re-establishment of the old atomic hypothesis on a new empirical foundation. It is obvious, that if elementary matter consists of indestructible and indivisible particles, each of which constantly preserves the same weight relatively to all the others, compounds formed by the aggregation of two, three, four, or more such particles must exemplify the rule of combination in definite proportions deduced from observation.

In the meanwhile, the gradual reception of the undulatory theory of light necessitated the assumption of the existence of an 'ether' filling all space. But whether this ether was to be regarded as a strictly material and continuous substance was an undecided point, and hence the revived atomism escaped strangling in its birth. For it is clear, that if the ether is admitted to be a continuous material substance, Democritic atomism is at an end and Cartesian continuity takes its place.

The real value of this hypothesis;

The real value of the new atomic hypothesis, however, did not lie in the two points which Democritus and his followers would have considered essential—namely, the indivisibility of the 'atoms' and the presence of an interatomic vacuum—but in the assumption that, to the extent to which our means of analysis take us, material bodies consist of definite minute masses, each of which, so far as physical and chemical processes of division go, may be regarded as a unit—having a practically permanent individuality. Just as a man is the unit of sociology, without reference to the actual fact of his divisibility, so such a minute mass is the unit of physico-chemical science—that smallest material particle which under any given circumstances acts as a whole.[1]

it predicates the existence of units of matter.

[1] 'Molecule' would be the more appropriate name for such a particle. Unfortunately, chemists employ this term in a special sense, as a name for

The doctrine of specific heat originated in the eighteenth century. It means that the same mass of a body, under the same circumstances, always requires the same quantity of heat to raise it to a given temperature, but that equal masses of different bodies require different quantities. Ultimately, it was found that the quantities of heat required to raise equal masses of the more perfect gases, through equal ranges of temperature, were inversely proportional to their combining weights. Thus a definite relation was established between the hypothetical units and heat. The phenomena of electrolytic decomposition showed that there was a like close relation between these units and electricity. The quantity of electricity generated by the combination of any two units is sufficient to separate any other two which are susceptible of such decomposition. The phenomena of isomorphism showed a relation between the units and crystalline forms; certain units are thus able to replace others in a crystalline body without altering its form, and others are not.

Again, the laws of the effect of pressure and heat on gaseous bodies, the fact that they combine in definite proportions by volume, and that such proportion bears a simple relation to their combining weights, all harmonised with the Daltonian hypothesis, and led to the bold speculation known as the law of Avogadro—that all gaseous bodies, under the same physical conditions, contain the same number of units. In the form in which it was first enunciated, this hypothesis was incorrect—perhaps it is not exactly true in any form; but it is hardly too much to say that chemistry and molecular physics would never have advanced to their present condition unless it had been assumed to be true. Another immense service rendered by

an aggregation of their smallest particles, for which they retain the designation of 'atoms.'

Dalton, as a corollary of the new atomic doctrine, was the creation of a system of symbolic notation, which not only made the nature of chemical compounds and processes easily intelligible and easy of recollection, but, by its very form, suggested new lines of inquiry. The atomic notation was as serviceable to chemistry as the binomial nomenclature and the classificatory schematism of Linnæus were to zoology and botany.

In biology a like theory of molecular structure.

Side by side with these advances arose another, which also has a close parallel in the history of biological science. If the unit of a compound is made up by the aggregation of elementary units, the notion that these must have some sort of definite arrangement inevitably suggests itself; and such phenomena as double decomposition pointed, not only to the existence of a molecular architecture, but to the possibility of modifying a molecular fabric without destroying it, by taking out some of the component units and replacing them by others. The class of neutral salts, for example, includes a great number of bodies in many ways similar, in which the basic molecules, or the acid molecules, may be replaced by other basic and other acid molecules without altering the neutrality of the salt; just as a cube of bricks remains a cube, so long as any brick that is taken out is replaced by another of the same shape and dimensions, whatever its weight or other properties may be. Facts of this kind gave rise to the conception of 'types' of molecular structure, just as the recognition of the unity in diversity of the structure of the species of plants and animals gave rise to the notion of biological 'types.' The notation of chemistry enabled these ideas to be represented with precision; and they acquired an immense importance, when the improvement of methods of analysis, which took place about the beginning of our period, enabled the composition of the so-called 'organic' bodies to be determined with rapidity

and precision.[1] A large proportion of these compounds contain not more than three or four elements, of which carbon is the chief; but their number is very great, and the diversity of their physical and chemical properties is astonishing. The ascertainment of the proportion of each element in these compounds affords little or no help towards accounting for their diversities; widely different bodies being often very similar, or even identical, in that respect. And, in the last case, that of *isomeric* compounds, the appeal to diversity of arrangement of the identical component units was the only obvious way out of the difficulty. Here, again, hypothesis proved to be of great value; not only was the search for evidence of diversity of molecular structure successful, but the study of the process of taking to pieces led to the discovery of the way to put together; and vast numbers of compounds, some of them previously known only as products of the living economy, have thus been artificially constructed. Chemical work, at the present day, is, to a large extent, synthetic or creative—that is to say, the chemist determines, theoretically, that certain non-existent compounds ought to be producible, and he proceeds to produce them.

It is largely because the chemical theory and practice of our epoch have passed into this deductive and synthetic stage, that they are entitled to the name of the 'New Chemistry' which they commonly receive. But this new chemistry has grown up by the help of hypotheses, such as those of Dalton and of Avogadro, and that singular conception of 'bonds' invented to colligate the facts of 'valency' or 'atomicity,' the first of which took some time to make its way; while the second fell into oblivion, for many years

[1] 'At present more organic analyses are made in a single day than were accomplished before Liebig's time in a whole year.'—Hofmann, *Faraday Lecture*, p. 46.

after it was propounded, for lack of empirical justification. As for the third, it may be doubted if anyone regards it as more than a temporary contrivance.

But some of these hypotheses have done yet further service. Combining them with the mechanical theory of heat and the doctrine of the conservation of energy, which are also products of our time, physicists have arrived at an entirely new conception of the nature of gaseous bodies and of the relation of the physico-chemical units of matter to the different forms of energy. The conduct of gases under varying pressure and temperature, their diffusibility, their relation to radiant heat and to light, the evolution of heat when bodies combine, the absorption of heat when they are dissociated, and a host of other molecular phenomena, have been shown to be deducible from the dynamical and statical principles which apply to molar motion and rest; and the tendency of physico-chemical science is clearly towards the reduction of the problems of the world of the infinitely little, as it already has reduced those of the infinitely great world, to questions of mechanics.[1]

In the meanwhile, the primitive atomic theory, which has served as the scaffolding for the edifice of modern physics and chemistry, has been quietly dismissed. I cannot discover that any contemporary physicist or chemist believes in the real indivisibility of atoms, or in an interatomic matterless vacuum. 'Atoms' appear to be used as mere names for physico-chemical units which have not yet been subdivided, and 'molecules' for physico-chemical units which are aggregates of the former. And these individualised particles are supposed to move in an endless

[1] In the preface to his *Mécanique Chimique* M. Berthelot declares his object to be 'ramener la chimie tout entière . . . aux mêmes principes mécaniques qui régissent déjà les diverses branches de la physique.'

ocean of a vastly more subtle matter—the ether. If this ether is a continuous substance, therefore, we have got back from the hypothesis of Dalton to that of Descartes. But there is much reason to believe that science is going to make a still further journey, and, in form, if not altogether in substance, to return to the point of view of Aristotle.

Elementary bodies

The greater number of the so-called 'elementary' bodies, now known, had been discovered before the commencement of our epoch; and it had become apparent that they were by no means equally similar or dissimilar, but that some of them, at any rate, constituted groups, the several members of which were as much like one another as they were unlike the rest. Chlorine, iodine, bromine, and fluorine thus formed a very distinct group; sulphur and selenium another; boron and silicon another; potassium, sodium, and lithium another; and so on. In some cases, the atomic weights of such allied bodies were nearly the same, or could be arranged in series, with like differences between the several terms. In fact, the elements afforded indications that they were susceptible of a classification in natural groups, such as those into which animals and plants fall.

fall into different series.

Recently this subject has been taken up afresh, with a result which may be stated roughly in the following terms. If the sixty-five or sixty-eight recognised 'elements' are arranged in the order of their atomic weights —from hydrogen, the lightest, as unity, to uranium, the heaviest, as 240—the series does not exhibit one continuous progressive modification in the physical and chemical characters of its several terms, but breaks up into a number of sections, in each of which the several terms present analogies with the corresponding terms of the other series.

Thus, the whole series does not run

$$a, b, c, d, e, f, g, h, i, k, \text{&c.},$$

but

$$a, b, c, d, \text{A}, \text{B}, \text{C}, \text{D}, \alpha, \beta, \gamma, \delta, \text{&c.};$$

so that it is said to express a *periodic law* of recurrent similarities. Or the relation may be expressed in another way. In each section of the series, the atomic weight is greater than in the preceding section, so that if w is the atomic weight of any element in the first segment, $w+x$ will represent the atomic weight of any element in the next, and $w+x+y$ the atomic weight of any element in the next, and so on. Therefore the sections may be represented as parallel series, the corresponding terms of which have analogous properties; each successive series starting with a body the atomic weight of which is greater than that of any in the preceding series, in the following fashion:

d	D	δ
c	C	γ
b	B	β
a	A	a
w	$w+x$	$w+x+y$

This is a conception with which biologists are very familiar, animal and plant groups constantly appearing as series of parallel modifications of similar and yet different primary forms. In the living world, facts of this kind are now understood to mean evolution from a common prototype. It is difficult to imagine that in the not-living world they are devoid of significance. Is it not possible, nay probable, that they may mean the evolution of our 'elements' from a primary undifferentiated form of matter? Fifty years ago, such a suggestion would have been scouted as a revival of the dreams of the alchemists. At present, it may be said to be the burning question of physico-chemical science.

The possibility of a primary form of matter.

In fact, the so-called 'vortex-ring' hypothesis is a very serious and remarkable attempt to deal with material units from a point of view which is consistent with the doctrine of evolution. It supposes the ether to be a uniform substance, and that the 'elementary' units are, broadly speaking, permanent whirlpools, or vortices, of this ether, the properties of which depend on their actual and potential modes of motion. It is curious and highly interesting to remark that this hypothesis reminds us not only of the speculations of Descartes, but of those of Aristotle. The resemblance of the 'vortex-rings' to the 'tourbillons' of Descartes is little more than nominal; but the correspondence between the modern and the ancient notion of a distinction between primary and derivative matter is, to a certain extent, real. For this ethereal 'Urstoff' of the modern corresponds very closely with the πρώτη ὕλη of Aristotle, the *materia prima* of his mediæval followers; while matter, differentiated into our elements, is the equivalent of the first stage of progress towards the ἐσχάτη ὕλη, or finished matter, of the ancient philosophy.

If the material units of the existing order of nature are specialised portions of a relatively homogeneous *materia prima*—which were originated under conditions that have long ceased to exist and which remain unchanged and unchangeable under all conditions, whether natural or artificial, hitherto known to us—it follows that the speculation that they may be indefinitely altered, or that new units may be generated under conditions yet to be discovered, is perfectly legitimate. Theoretically, at any rate, the transmutability of the elements is a verifiable scientific hypothesis; and such inquiries as those which have been set afoot, into the possible dissociative action of the great heat of the sun upon our elements, are not only legitimate, but are likely to yield results which, whether affirmative or

negative, will be of great importance. The idea that atoms are absolutely ingenerable and immutable 'manufactured articles' stands on the same sort of foundation as the idea that biological species are 'manufactured articles' stood thirty years ago; and the supposed constancy of the elementary atoms, during the enormous lapse of time measured by the existence of our universe, is of no more weight against the possibility of change in them, in the infinity of antecedent time, than the constancy of species in Egypt, since the days of Rameses or of Cheops, is evidence of their immutability during all past epochs of the earth's history. It seems safe to prophesy that the hypothesis of the evolution of the elements from a primitive matter will, in future, play no less a part in the history of science than the atomic hypothesis, which, to begin with, had no greater, if so great, an empirical foundation.

The old and the new atomic theory.

It may perhaps occur to the reader that the boasted progress of physical science does not come to much, if our present conceptions of the fundamental nature of matter are expressible in terms employed, more than two thousand years ago, by the old 'master of those that know.' Such a criticism, however, would involve forgetfulness of the fact, that the connotation of these terms, in the mind of the modern, is almost infinitely different from that which they possessed in the mind of the ancient, philosopher. In antiquity, they meant little more than vague speculation; at the present day, they indicate definite physical conceptions, susceptible of mathematical treatment, and giving rise to innumerable deductions, the value of which can be experimentally tested. The old notions produced little more than floods of dialectics; the new are powerful aids towards the increase of solid knowledge.

Everyday observation shows that, of the bodies which

compose the material world, some are in motion and some are, or appear to be, at rest. Of the bodies in motion, some, like the sun and stars, exhibit a constant movement, regular in amount and direction, for which no external cause appears. Others, as stones and smoke, seem also to move of themselves when external impediments are taken away. But these appear to tend to move in opposite directions: the bodies we call heavy, such as stones, downwards, and the bodies we call light, at least such as smoke and steam, upwards. And, as we further notice that the earth, below our feet, is made up of heavy matter, while the air, above our heads, is extremely light matter, it is easy to regard this fact as evidence that the lower region is the place to which heavy things tend—their proper place, in short—while the upper region is the proper place of light things; and to generalise the facts observed by saying that bodies, which are free to move, tend towards their proper places. All these seem to be natural motions, dependent on the inherent faculties, or tendencies, of bodies themselves. But there are other motions which are artificial or violent, as when a stone is thrown from the hand, or is knocked by another stone in motion. In such cases as these, for example, when a stone is cast from the hand, the distance travelled by the stone appears to depend partly on its weight and partly upon the exertion of the thrower. So that, the weight of the stone remaining the same, it looks as if the motive power communicated to it were measured by the distance to which the stone travels—as if, in other words, the power needed to send it a hundred yards was twice as great as that needed to send it fifty yards. These, apparently obvious, conclusions from the everyday appearances of rest and motion fairly represent the state of opinion upon the subject which prevailed among the ancient Greeks, and remained dominant until the age of Galileo. The

(2) Conservation of energy.

publication of the 'Principia' of Newton, in 1686–7, marks the epoch at which the progress of mechanical physics had effected a complete revolution of thought on these subjects. By this time, it had been made clear that the old generalisations were either incomplete or totally erroneous; that a body, once set in motion, will continue to move in a straight line for any conceivable time or distance, unless it is interfered with; that any change of motion is proportional to the 'force' which causes it, and takes place in the direction in which that 'force' is exerted; and that, when a body in motion acts as a cause of motion on another, the latter gains as much as the former loses, and *vice versâ*. It is to be noted, however, that while, in contradistinction to the ancient idea of the inherent tendency to motion of bodies, the absence of any such spontaneous power of motion was accepted as a physical axiom by the moderns, the old conception virtually maintained itself in a new shape. For, in spite of Newton's well-known warning against the 'absurdity' of supposing that one body can act on another at a distance through a vacuum, the ultimate particles of matter were generally assumed to be the seats of perennial causes of motion termed 'attractive and repulsive forces,' in virtue of which, any two such particles, without any external impression of motion, or intermediate material agent, were supposed to tend to approach or remove from one another; and this view of the duality of the causes of motion is very widely held at the present day.

Another important result of investigation, attained in the seventeenth century, was the proof and quantitative estimation of physical inertia. In the old philosophy, a curious conjunction of ethical and physical prejudices had led to the notion that there was something ethically bad and physically obstructive about matter. Aristotle attri-

butes all irregularities and apparent dysteleologies in nature to the disobedience, or sluggish yielding, of matter to the shaping and guiding influence of those reasons and causes which were hypostatised in his ideal 'Forms.' In modern science, the conception of the inertia, or resistance to change, of matter is complex. In part, it contains a corollary from the law of causation: A body cannot change its state in respect of rest or motion without a sufficient cause. But, in part, it contains generalisations from experience. One of these is that there is no such sufficient cause resident in any body, and that therefore it will rest, or continue in motion, so long as no external cause of change acts upon it. The other is that the effect which the impact of a body in motion produces upon the body on which it impinges depends, other things being alike, on the relation of a certain quality of each which is called 'mass.' Given a cause of motion of a certain value, the amount of motion, measured by distance travelled in a certain time, which it will produce in a given quantity of matter, say a cubic inch, is not always the same, but depends on what that matter is—a cubic inch of iron will go faster than a cubic inch of gold. Hence, it appears, that since equal amounts of motion have, *ex hypothesi*, been produced, the amount of motion in a body does not depend on its speed alone, but on some property of the body. To this the name of 'mass' has been given. And, since it seems reasonable to suppose that a large quantity of matter, moving slowly, possesses as much motion as a small quantity moving faster, 'mass' has been held to express 'quantity of matter.' It is further demonstrable that, at any given time and place, the relative mass of any two bodies is expressed by the ratio of their weights.

When all these great truths respecting molar motion, or the movements of visible and tangible masses, had been shown to hold good not only of terrestrial bodies, but of all

those which constitute the visible universe, and the movements of the macrocosm had thus been expressed by a general mechanical theory, there remained a vast number of phenomena, such as those of light, heat, electricity, magnetism, and those of the physical and chemical changes which do not involve molar motion. Newton's corpuscular theory of light was an attempt to deal with one great series of these phenomena on mechanical principles, and it maintained its ground until, at the beginning of the nineteenth century, the undulatory theory proved itself to be a much better working hypothesis. Heat, up to that time, and indeed much later, was regarded as an imponderable substance, *caloric*; as a thing which was absorbed by bodies when they were warmed, and was given out as they cooled; and which, moreover, was capable of entering into a sort of chemical combination with them, and so becoming latent. Rumford and Davy had given a great blow to this view of heat by proving that the quantity of heat which two portions of the same body could be made to give out, by rubbing them together, was practically illimitable. This result brought philosophers face to face with the contradiction of supposing that a finite body could contain an infinite quantity of another body; but it was not until 1843, that clear and unquestionable experimental proof was given of the fact that there is a definite relation between mechanical work and heat; that so much work always gives rise, under the same conditions, to so much heat, and so much heat to so much mechanical work. Thus originated the mechanical theory of heat, which became the starting point of the modern doctrine of the conservation of energy. Molar motion had appeared to be destroyed by friction. It was proved that no destruction took place, but that an exact equivalent of the energy of the lost molar motion appears as that of the *molecular* motion, or motion of the smallest par-

Mechanical theory of heat.

ticles of a body, which constitutes heat. The loss of the masses is the gain of their particles.

Earlier approaches towards doctrine of conservation.

Before 1843, however, the doctrine of the conservation of energy had been approached. Bacon's chief contribution to positive science is the happy guess (for the context shows that it was little more) that heat may be a mode of motion; Descartes affirmed the quantity of motion in the world to be constant; Newton nearly gave expression to the complete theorem; while Rumford's and Davy's experiments suggested, though they did not prove, the equivalency of mechanical and thermal energy. Again, the discovery of voltaic electricity, and the marvellous development of knowledge, in that field, effected by such men as Davy, Faraday, Oersted, Ampère, and Melloni, had brought to light a number of facts which tended to show that the so-called 'forces' at work in light, heat, electricity, and magnetism, in chemical and in mechanical operations, were intimately, and, in various cases, quantitatively, related. It was demonstrated that any one could be obtained at the expense of any other; and apparatus was devised which exhibited the evolution of all these kinds of action from one source of energy. Hence the idea of the 'correlation of forces' which was the immediate forerunner of the doctrine of the conservation of energy.

It is a remarkable evidence of the greatness of the progress in this direction which has been effected in our time, that even the second edition of the 'History of the Inductive Sciences,' which was published in 1846, contains no allusion either to the general view of the 'Correlation of Forces' published in England in 1842, or to the publication in 1843 of the first of the series of experiments by which the mechanical equivalent of heat was correctly ascertained.[1]

[1] This is the more curious, as Ampère's hypothesis that vibrations of molecules, causing and caused by vibrations of the ether, constitute heat, is

Such a failure on the part of a contemporary, of great acquirements and remarkable intellectual powers, to read the signs of the times, is a lesson and a warning worthy of being deeply pondered by anyone who attempts to prognosticate the course of scientific progress.

What this doctrine is.

I have pointed out that the growth of clear and definite views respecting the constitution of matter has led to the conclusion that, so far as natural agencies are concerned, it is ingenerable and indestructible. In so far as matter may be conceived to exist in a purely passive state, it is, imaginably, older than motion. But, as it must be assumed to be susceptible of motion, a particle of bare matter at rest must be endowed with the potentiality of motion. Such a particle, however, by the supposition, can have no energy, for there is no cause why it should move. Suppose now that it receives an impulse, it will begin to move with a velocity inversely proportional to its mass, on the one hand, and directly proportional to the strength of the impulse, on the other, and will possess *kinetic energy*, in virtue of which it will not only continue to move for ever if unimpeded, but if it impinges on another such particle, it will impart more or less of its motion to the latter. Let it be conceived that the particle acquires a tendency to move, and that nevertheless it does not move. It is then in a condition totally different from that in which it was at first. A cause competent to produce motion is operating upon it, but, for

discussed. See vol. ii. p. 587, 2nd ed. In the *Philosophy of the Inductive Sciences*, 2nd ed., 1847, p. 239, Whewell remarks, *à propos* of Bacon's definition of heat, 'that it is an expansive, restrained motion, modified in certain ways, and exerted in the smaller particles of the body;' that 'although the exact nature of heat is still an obscure and controverted matter, the science of heat now consists of many important truths; and that to none of these truths is there any approximation in Bacon's essay.' In point of fact, Bacon's statement, however much open to criticism, does contain a distinct approximation to the most important of all the truths respecting heat which had been discovered when Whewell wrote.

some reason or other, is unable to give rise to motion. If the obstacle is removed, the energy which was there, but could not manifest itself, at once gives rise to motion. While the restraint lasts, the energy of the particle is merely potential; and the case supposed illustrates what is meant by *potential energy*. In this contrast of the potential with the actual, modern physics is turning to account the most familiar of Aristotelian distinctions—that between δύναμις and ἐνέργεια.

That kinetic energy appears to be imparted by impact is a fact of daily and hourly experience: we see bodies set in motion by bodies, already in motion, which seem to come in contact with them. It is a truth which could have been learned by nothing but experience, and which cannot be explained, but must be taken as an ultimate fact about which, explicable or inexplicable, there can be no doubt. Strictly speaking, we have no direct apprehension of any other cause of motion. But experience furnishes innumerable examples of the production of kinetic energy in a body previously at rest, when no impact is discernible as the cause of that energy. In all such cases, the presence of a second body is a necessary condition; and the amount of kinetic energy, which its presence enables the first to gain, is strictly dependent on the relative positions of the two. Hence the phrase *energy of position*, which is frequently used as equivalent to potential energy. If a stone is picked up and held, say, six feet above the ground, it has *potential energy*, because, if let go, it will immediately begin to move towards the earth; and this energy may be said to be *energy of position*, because it depends upon the relative position of the earth and the stone. The stone is solicited to move but cannot, so long as the muscular strength of the holder prevents the solicitation from taking effect. The stone, therefore, has potential energy, which becomes kinetic if it

is let go, and the amount of that kinetic energy which will be developed before it strikes the earth depends on its position—on the fact that it is, say, six feet off the earth, neither more nor less. Moreover, it can be proved that the raiser of the stone had to exert as much energy in order to place it in its position, as it will develop in falling. Hence the energy which was exerted, and apparently exhausted, in raising the stone, is potentially in the stone, in its raised position, and will manifest itself when the stone is set free. Thus the energy, withdrawn from the general stock to raise the stone, is returned when it falls, and there is no change in the total amount. Energy, as a whole, is conserved.

Taking this as a very broad and general statement of the essential facts of the case, the raising of the stone is intelligible enough, as a case of the communication of motion from one body to another. But the potential energy of the raised stone is not so easily intelligible. To all appearance, there is nothing either pushing or pulling it towards the earth, or the earth towards it; and yet it is quite certain that the stone tends to move towards the earth and the earth towards the stone, in the way defined by the law of gravitation.

In the currently accepted language of science, the cause of motion, in all such cases as this, when bodies tend to move towards or away from one another, without any discernible impact of other bodies, is termed a 'force,' which is called 'attractive' in the one case, and 'repulsive' in the other. And such attractive or repulsive forces are often spoken of as if they were real things, capable of exerting a pull, or a push, upon the particles of matter concerned. Thus the potential energy of the stone is commonly said to be due to the 'force' of gravity which is continually operating upon it.

Another illustration may make the case plainer. The bob of a pendulum swings first to one side and then to the other of the centre of the arc which it describes. Suppose

it to have just reached the summit of its right-hand half-swing. It is said that the 'attractive forces' of the bob for the earth, and of the earth for the bob, set the former in motion; and as these 'forces' are continually in operation, they confer an accelerated velocity on the bob; until, when it reaches the centre of its swing, it is, so to speak, fully charged with kinetic energy. If, at this moment, the whole material universe, except the bob, were abolished, it would move for ever in the direction of a tangent to the middle of the arc described. As a matter of fact, it is compelled to travel through its left-hand half-swing, and thus virtually to go up hill. Consequently, the 'attractive forces' of the bob and the earth are now acting against it, and constitute a resistance which the charge of kinetic energy has to overcome. But, as this charge represents the operation of the attractive forces during the passage of the bob through the right-hand half-swing down to the centre of the arc, so it must needs be used up by the passage of the bob upwards from the centre of the arc to the summit of the left-hand half-swing. Hence, at this point, the bob comes to a momentary rest. The last fraction of kinetic energy is just neutralised by the action of the attractive forces, and the bob has only potential energy equal to that with which it started. So that the sum of the phenomena may be stated thus: At the summit of either half-arc of its swing, the bob has a certain amount of potential energy; as it descends it gradually exchanges this for kinetic energy, until at the centre it possesses an equivalent amount of kinetic energy; from this point onwards, it gradually loses kinetic energy as it ascends, until, at the summit of the other half-arc, it has acquired an exactly similar amount of potential energy. Thus, on the whole transaction, nothing is either lost or gained; the quantity of energy is always the same, but it passes from one form into the other.

To all appearance, the phenomena exhibited by the pendulum are not to be accounted for by impact: in fact, it is usually assumed that corresponding phenomena would take place if the earth and the pendulum were situated in an absolute vacuum, and at any conceivable distance from one another. If this be so, it follows that there must be two totally different kinds of causes of motion: the one impact —a *vera causa*, of which, to all appearance, we have constant experience; the other, attractive or repulsive 'force'— a metaphysical entity which is physically inconceivable. Newton expressly repudiated the notion of the existence of attractive forces, in the sense in which that term is ordinarily understood; and he refused to put forward any hypothesis as to the physical cause of the so-called 'attraction of gravitation.' As a general rule, his successors have been content to accept the doctrine of attractive and repulsive forces, without troubling themselves about the philosophical difficulties which it involves. But this has not always been the case; and the attempt of Le Sage, in the last century, to show that the phenomena of attraction and repulsion are susceptible of explanation by his hypothesis of bombardment by ultra-mundane particles, whether tenable or not, has the great merit of being an attempt to get rid of the dual conception of the causes of motion which has hitherto prevailed. On this hypothesis, the hammering of the ultra-mundane corpuscles on the bob confers its kinetic energy, on the one hand, and takes it away on the other; and the state of potential energy means the condition of the bob during the instant at which the energy, conferred by the hammering during the one half-arc, has just been exhausted by the hammering during the other half-arc. It seems safe to look forward to the time when the conception of attractive and repulsive forces, having served its purpose as a useful piece of scientific scaffolding, will be replaced by the deduc-

tion of the phenomena known as attraction and repulsion, from the general laws of motion.

The doctrine of the conservation of energy which I have endeavoured to illustrate is thus defined by the late Clerk Maxwell:

'The total energy of any body or system of bodies is a quantity which can neither be increased nor diminished by any mutual action of such bodies, though it may be transformed into any one of the forms of which energy is susceptible.' It follows that energy, like matter, is indestructible and ingenerable in nature. The phenomenal world, so far as it is material, expresses the evolution and involution of energy, its passage from the kinetic to the potential condition and back again. Wherever motion of matter takes place, that motion is effected at the expense of part of the total store of energy.

Hence, as the phenomena exhibited by living beings, in so far as they are material, are all molar or molecular motions, these are included under the general law. A living body is a machine by which energy is transformed in the same sense as a steam-engine is so, and all its movements, molar and molecular, are to be accounted for by the energy which is supplied to it. The phenomena of consciousness which arise, along with certain transformations of energy, cannot be interpolated in the series of these transformations, inasmuch as they are not motions to which the doctrine of the conservation of energy applies. And, for the same reason, they do not necessitate the using up of energy; a sensation has no mass and cannot be conceived to be susceptible of movement. That a particular molecular motion does give rise to a state of consciousness is experimentally certain; but the how and why of the process are just as inexplicable as in the case of the communication of kinetic energy by impact.

When dealing with the doctrine of the ultimate constitution of matter, we found a certain resemblance between the oldest speculations and the newest doctrines of physical philosophers. But there is no such resemblance between the ancient and modern views of motion and its causes, except in so far as the conception of attractive and repulsive forces may be regarded as the modified descendant of the Aristotelian conception of forms. In fact, it is hardly too much to say that the essential and fundamental difference between ancient and modern physical science lies in the ascertainment of the true laws of statics and dynamics in the course of the last three centuries; and in the invention of mathematical methods of dealing with all the consequences of these laws. The ultimate aim of modern physical science is the deduction of the phenomena exhibited by material bodies from physico-mathematical first principles. Whether the human intellect is strong enough to attain the goal set before it may be a question, but thither will it surely strive.

(3) Evolution.

The third great scientific event of our time, the rehabilitation of the doctrine of evolution, is part of the same tendency of increasing knowledge to unify itself, which has led to the doctrine of the conservation of energy. And this tendency, again, is mainly a product of the increasing strength conferred by physical investigation on the belief in the universal validity of that orderly relation of facts, which we express by the so-called 'Laws of Nature.'

The growth of a plant from its seed, of an animal from its egg, the apparent origin of innumerable living things from mud, or from the putrefying remains of former organisms, had furnished the earlier scientific thinkers with abundant analogies suggestive of the conception of a corresponding method of cosmic evolution from a formless 'chaos' to an ordered world which might either continue for ever

or undergo dissolution into its elements before starting on a new course of evolution. It is therefore no wonder that, from the days of the Ionian school onwards, the view that the universe was the result of such a process should have maintained itself as a leading dogma of philosophy. The emanistic theories which played so great a part in Neoplatonic philosophy and Gnostic theology are forms of evolution. In the seventeenth century, Descartes propounded a scheme of evolution, as an hypothesis of what might have been the mode of origin of the world, while professing to accept the ecclesiastical scheme of creation, as an account of that which actually was its manner of coming into existence. In the eighteenth century, Kant put forth a remarkable speculation as to the origin of the solar system, closely similar to that subsequently adopted by Laplace and destined to become famous under the title of the 'nebular hypothesis.'

Early stages of this theory.

The careful observations and the acute reasonings of the Italian geologists of the seventeenth and eighteenth centuries; the speculations of Leibnitz in the 'Protogæa' and of Buffon in his 'Théorie de la Terre;' the sober and profound reasonings of Hutton, in the latter part of the eighteenth century; all these tended to show that the fabric of the earth itself implied the continuance of processes of natural causation for a period of time as great, in relation to human history, as the distances of the heavenly bodies from us are, in relation to terrestrial standards of measurement. The abyss of time began to loom as large as the abyss of space. And this revelation to sight and touch, of a link here and a link there of a practically infinite chain of natural causes and effects, prepared the way, as perhaps nothing else has done, for the modern form of the ancient theory of evolution.

In the beginning of the eighteenth century, De Maillet made the first serious attempt to apply the doctrine to the

living world. In the latter part of it, Erasmus Darwin, Goethe, Treviranus, and Lamarck took up the work more vigorously and with better qualifications. The question of special creation, or evolution, lay at the bottom of the fierce disputes which broke out in the French Academy between Cuvier and St.-Hilaire; and, for a time, the supporters of biological evolution were silenced, if not answered, by the alliance of the greatest naturalist of the age with their ecclesiastical opponents. Catastrophism, a short-sighted teleology, and a still more short-sighted orthodoxy, joined forces to crush evolution.

Lyell and Poulett Scrope, in this country, resumed the work of the Italians and of Hutton; and the former, aided by a marvellous power of clear exposition, placed upon an irrefragable basis the truth that natural causes are competent to account for all events, which can be proved to have occurred, in the course of the secular changes which have taken place during the deposition of the stratified rocks. The publication of 'The Principles of Geology,' in 1830, constituted an epoch in geological science. But it also constituted an epoch in the modern history of the doctrine of evolution, by raising in the mind of every intelligent reader this question: If natural causation is competent to account for the not-living part of our globe, why should it not account for the living part?

By keeping this question before the public for some thirty years, Lyell, though the keenest and most formidable of the opponents of the transmutation theory, as it was formulated by Lamarck, was of the greatest possible service in facilitating the reception of the sounder doctrines of a later day. And, in like fashion, another vehement opponent of the transmutation of species, the elder Agassiz, was doomed to help the cause he hated. Agassiz not only maintained the fact of the progressive advance in organisation of the

inhabitants of the earth at each successive geological epoch, but he insisted upon the analogy of the steps of this progression with those by which the embryo advances to the adult condition, among the highest forms of each group. In fact, in endeavouring to support these views he went a good way beyond the limits of any cautious interpretation of the facts then known.

Although little acquainted with biological science, Whewell seems to have taken particular pains with that part of his work which deals with the history of geological and biological speculation; and several chapters of his seventeenth and eighteenth books, which comprise the history of physiology, of comparative anatomy and of the palætiological sciences, vividly reproduce the controversies of the early days of the Victorian epoch. But here, as in the case of the doctrine of the conservation of energy, the historian of the inductive sciences has no prophetic insight; not even a suspicion of that which the near future was to bring forth. And those who still repeat the once favourite objection that Darwin's 'Origin of Species' is nothing but a new version of the 'Philosophie zoologique' will find that, so late as 1844, Whewell had not the slightest suspicion of Darwin's main theorem, even as a logical possibility. In fact, the publication of that theorem by Darwin and Wallace, in 1859, took all the biological world by surprise. Neither those who were inclined towards the 'progressive transmutation' or 'development' doctrine, as it was then called, nor those who were opposed to it, had the slightest suspicion that the tendency to variation in living beings, which all admitted as a matter of fact; the selective influence of conditions, which no one could deny to be a matter of fact, when his attention was drawn to the evidence; and the occurrence of great geological changes, which also was matter of fact; could be used as the only necessary postu-

Darwin

lates of a theory of the evolution of plants and animals which, even if not, at once, competent to explain all the known facts of biological science, could not be shown to be inconsistent with any. So far as biology is concerned, the publication of the 'Origin of Species,' for the first time, put the doctrine of evolution, in its application to living things, upon a sound scientific foundation. It became an instrument of investigation, and in no hands did it prove more brilliantly profitable than in those of Darwin himself. His publications on the effects of domestication in plants and animals, on the influence of cross-fertilisation, on flowers as organs for effecting such fertilisation, on insectivorous plants, on the motions of plants, pointed out the routes of exploration which have since been followed by hosts of inquirers, to the great profit of science.

Darwin found the biological world a more than sufficient field for even his great powers, and left the cosmical part of the doctrine to others. Not much has been added to the nebular hypothesis, since the time of Laplace, except that the attempt to show (against that hypothesis) that all nebulæ are star clusters, has been met by the spectroscopic proof of the gaseous condition of some of them. Moreover, physicists of the present generation appear now to accept the secular cooling of the earth, which is one of the corollaries of that hypothesis. In fact, attempts have been made, by the help of deductions from the data of physics, to lay down an approximate limit to the number of millions of years which have elapsed since the earth was habitable by living beings. If the conclusions thus reached should stand the test of further investigation, they will undoubtedly be very valuable. But, whether true or false, they can have no influence upon the doctrine of evolution in its application to living organisms. The occurrence of successive forms of life upon our globe is an historical fact, which cannot be

disputed; and the relation of these successive forms, as stages of evolution of the same type, is established in various cases. The biologist has no means of determining the time over which the process of evolution has extended, but accepts the computation of the physical geologist and the physicist, whatever that may be.

and philosophy.

Evolution as a philosophical doctrine applicable to all phenomena, whether physical or mental, whether manifested by material atoms or by men in society, has been dealt with systematically in the 'Synthetic Philosophy' of Mr. Herbert Spencer. Comment on that great undertaking would not be in place here. I mention it because, so far as I know, it is the first attempt to deal, on scientific principles, with modern scientific facts and speculations. For the 'Philosophie positive' of M. Comte, with which Mr. Spencer's system of philosophy is sometimes compared, though it professes a similar object, is unfortunately permeated by a thoroughly unscientific spirit, and its author had no adequate acquaintance with the physical sciences even of his own time.

The doctrine of evolution, so far as the present physical cosmos is concerned, postulates the fixity of the rules of operation of the causes of motion in the material universe. If all kinds of matter are modifications of one kind, and if all modes of motion are derived from the same energy, the orderly evolution of physical nature out of one substratum and one energy implies that the rules of action of that energy should be fixed and definite. In the past history of the universe, back to that point, there can be no room for chance or disorder. But it is possible to raise the question whether this universe of simplest matter and definitely operating energy, which forms our hypothetical starting point, may not itself be a product of evolution

from a universe of such matter, in which the manifestations of energy were not definite—in which, for example, our laws of motion held good for some units and not for others, or for the same units at one time and not at another—and which would therefore be a real epicurean chance-world?

For myself, I must confess that I find the air of this region of speculation too rarefied for my constitution, and I am disposed to take refuge in 'ignoramus et ignorabimus.'

Other achievements in physical science.

The execution of my further task, the indication of the most important achievements in the several branches of physical science during the last fifty years, is embarrassed by the abundance of the objects of choice; and by the difficulty which everyone, but a specialist in each department, must find in drawing a due distinction between discoveries which strike the imagination by their novelty, or by their practical influence, and those unobtrusive but pregnant observations and experiments in which the germs of the great things of the future really lie. Moreover, my limits restrict me to little more than a bare chronicle of the events which I have to notice.

Physics and chemistry.

In physics and chemistry, the old boundaries of which sciences are rapidly becoming effaced, one can hardly go wrong in ascribing a primary value to the investigations into the relation between the solid, liquid, and gaseous states of matter on the one hand, and degrees of pressure and of heat on the other. Almost all, even the most refractory, solids have been vaporised by the intense heat of the electric arc; and the most refractory gases have been forced to assume the liquid, and even the solid, forms by the combination of high pressure with intense cold. It has further been shown that there is no discontinuity between these states—that a gas passes into the liquid state through a condition which is neither one nor the other, and that a

liquid body becomes solid, or a solid liquid, by the intermediation of a condition in which it is neither truly solid nor truly liquid.

Theoretical and experimental investigations have concurred in the establishment of the view that a gas is a body, the particles of which are in incessant rectilinear motion at high velocities, colliding with one another and bounding back when they strike the walls of the containing vessel; and, on this theory, the already ascertained relations of gaseous bodies to heat and pressure have been shown to be deducible from mechanical principles. Immense improvements have been effected in the means of exhausting a given space of its gaseous contents; and experimentation on the phenomena which attend the electric discharge and the action of radiant heat, within the extremely rarefied media thus produced, has yielded a great number of remarkable results, some of which have been made familiar to the public by the Gieseler tubes and the radiometer. Already, these investigations have afforded an unexpected insight into the constitution of matter and its relations with thermal and electric energy, and they open up a vast field for future inquiry into some of the deepest problems of physics. Other important steps, in the same direction, have been effected by investigations into the absorption of radiant heat proceeding from different sources by solid, fluid, and gaseous bodies. And it is a curious example of the interconnection of the various branches of physical science, that some of the results thus obtained have proved of great importance in meteorology.

The existence of numerous dark lines, constant in their number and position in the various regions of the solar spectrum, was made out by Fraunhofer in the early part of the present century, but more than forty years elapsed before their causes were ascertained and their importance

recognised. Spectroscopy, which then took its rise, is probably that employment of physical knowledge, already won, as a means of further acquisition, which most impresses the imagination. For it has suddenly and immensely enlarged our power of overcoming the obstacles which almost infinite minuteness on the one hand, and almost infinite distance on the other, have hitherto opposed to the recognition of the presence and the condition of matter. One eighteen-millionth of a grain of sodium in the flame of a spirit-lamp may be detected by this instrument; and, at the same time, it gives trustworthy indications of the material constitution not only of the sun, but of the farthest of those fixed stars and nebulæ which afford sufficient light to affect the eye, or the photographic plate, of the inquirer.

The spectroscope.

Electricity.

The mathematical and experimental elucidation of the phenomena of electricity, and the study of the relations of this form of energy with chemical and thermal action, had made extensive progress before 1837. But the determination of the influence of magnetism on light, the discovery of diamagnetism, of the influence of crystalline structure on magnetism, and the completion of the mathematical theory of electricity, all belong to the present epoch. To it also appertain the practical execution and the working out of the results of the great international system of observations on terrestrial magnetism, suggested by Humboldt in 1836; and the invention of instruments of infinite delicacy and precision for the quantitative determination of electrical phenomena. The voltaic battery has received vast improvements; while the invention of magneto-electric engines and of improved means of producing ordinary electricity has provided sources of electrical energy vastly superior to any before extant in power, and far more convenient for use.

It is perhaps this branch of physical science which may claim the palm for its practical fruits, no less than for the aid which it has furnished to the investigation of other parts of the field of physical science. The idea of the practicability of establishing a communication between distant points, by means of electricity, could hardly fail to have simmered in the minds of ingenious men since, well nigh a century ago, experimental proof was given that electric disturbances could be propagated through a wire twelve thousand feet long. Various methods of carrying the suggestion into practice had been carried out with some degree of success; but the system of electric telegraphy, which, at the present time, brings all parts of the civilised world within a few minutes of one another, originated only about the commencement of the epoch under consideration. In its influence on the course of human affairs, this invention takes its place beside that of gunpowder, which tended to abolish the physical inequalities of fighting men; of printing, which tended to destroy the effect of inequalities in wealth among learning men; of steam transport, which has done the like for travelling men. All these gifts of science are aids in the process of levelling up; of removing the ignorant and baneful prejudices of nation against nation, province against province, and class against class; of assuring that social order which is the foundation of progress, which has redeemed Europe from barbarism, and against which one is glad to think that those who, in our time, are employing themselves in fanning the embers of ancient wrong, in setting class against class, and in trying to tear asunder the existing bonds of unity, are undertaking a futile struggle. The telephone is only second in practical importance to the electric telegraph. Invented, as it were, only the other day, it has already taken its place as an appliance of daily life. Sixty years

ago, the extraction of metals from their solutions, by the electric current, was simply a highly interesting scientific fact. At the present day, the galvano-plastic art is a great industry; and, in combination with photography, promises to be of endless service in the arts. Electric lighting is another great gift of science to civilisation, the practical effects of which have not yet been fully developed, largely on account of its cost. But those whose memories go back to the tinder-box period, and recollect the cost of the first lucifer matches, will not despair of the results of the application of science and ingenuity to the cheap production of anything for which there is a large demand.

The influence of the progress of electrical knowledge and invention upon that of investigation in other fields of science is highly remarkable. The combination of electrical with mechanical contrivances has produced instruments by which, not only may extremely small intervals of time be exactly measured, but the varying rapidity of movements, which take place in such intervals and appear to the ordinary sense instantaneous, is recorded. The duration of the winking of an eye is a proverbial expression for an instantaneous action; but, by the help of the revolving cylinder and the electrical marking-apparatus, it is possible to obtain a graphic record of such an action, in which, if it endures a second, that second shall be subdivided into a hundred, or a thousand, equal parts, and the state of the action at each hundredth, or thousandth, of a second exhibited. In fact, these instruments may be said to be time-microscopes. Such appliances have not only effected a revolution in physiology, by the power of analysing the phenomena of muscular and nervous activity which they have conferred, but they have furnished new methods of measuring the rate of movement of projectiles to the artillerist. Again, the microphone, which renders the

minutest movements audible, and which enables a listener to hear the footfall of a fly, has equipped the sense of hearing with the means of entering almost as deeply into the penetralia of nature, as does the sense of sight.

Photography as an instrument of science.

That light exerts a remarkable influence in bringing about certain chemical combinations and decompositions was well known fifty years ago, and various more or less successful attempts to produce permanent pictures, by the help of that knowledge, had already been made. It was not till 1839, however, that practical success was obtained; but the 'daguerreotypes' were both cumbrous and costly, and photography would never have attained its present important development had not the progress of invention substituted paper and glass for the silvered plates then in use. It is not my affair to dwell upon the practical application of the photography of the present day, but it is germane to my purpose to remark that it has furnished a most valuable accessory to the methods of recording motions and lapse of time already in existence. In the hands of the astronomer and the meteorologist, it has yielded means of registering terrestrial, solar, planetary, and stellar phenomena, independent of the sources of error attendant on ordinary observation; in the hands of the physicist, not only does it record spectroscopic phenomena with unsurpassable ease and precision, but it has revealed the existence of rays having powerful chemical energy, or beyond the visible limits of either end of the spectrum; while, to the naturalist, it furnishes the means by which the forms of many highly complicated objects may be represented, without that possibility of error which is inherent in the work of the draughtsman. In fact, in many cases, the stern impartiality of photography is an objection to its employment: it makes no distinction between the important and the unimportant; and hence photographs of

dissections, for example, are rarely so useful as the work of a draughtsman who is at once accurate and intelligent.

Astronomy, The determination of the existence of a new planet, Neptune, far beyond the previously known bounds of the solar system, by mathematical deduction from the facts of perturbation; and the immediate confirmation of that determination, in the year 1846, by observers who turned their telescopes into the part of the heavens indicated as its place, constitute a remarkable testimony of nature to the validity of the principles of the astronomy of our time. In addition, so many new asteroids have been added to those which were already known to circulate in the place which theoretically should be occupied by a planet, between Mars and Jupiter, that their number now amounts to between two and three hundred. I have already alluded to the extension of our knowledge of the nature of the heavenly bodies by the employment of spectroscopy. It has not only thrown wonderful light upon the physical and chemical constitution of the sun, fixed stars, and nebulæ, and comets, but it holds out a prospect of obtaining definite evidence as to the nature of our so-called elementary bodies.

its relation to geology. The application of the generalisations of thermotics to the problem of the duration of the earth, and of deductions from tidal phenomena to the determination of the length of the day and of the time of revolution of the moon, in past epochs of the history of the universe; and the demonstration of the competency of the great secular changes, known under the general name of the precession of the equinoxes, to cause corresponding modifications in the climate of the two hemispheres of our globe, have brought astronomy into intimate relation with geology. Geology, in fact, proves that, in the course of the past history of the earth, the climatic conditions of the same region have been widely different, and seeks the explanation of this important truth from the

sister sciences. The facts that, in the middle of the Tertiary epoch, evergreen trees abounded within the arctic circle; and that, in the long subsequent Quaternary epoch, an arctic climate, with its accompaniment of gigantic glaciers, obtained in the northern hemisphere, as far south as Switzerland and Central France, are as well established as any truths of science. But, whether the explanation of these extreme variations in the mean temperature of a great part of the northern hemisphere is to be sought in the concomitant changes in the distribution of land and water surfaces of which geology affords evidence, or in astronomical conditions, such as those to which I have referred, is a question which must await its answer from the science of the future.

Biological sciences.

Turning now to the great steps in that vast progress which the biological sciences have made since 1837, we are met, on the threshold of our epoch, with perhaps the greatest of all—namely, the promulgation by Schwann, in 1839, of the generalisation known as the 'cell theory,' the application and extension of which by a host of subsequent investigators has revolutionised morphology, development, and physiology. Thanks to the immense series of labours thus inaugurated, the following fundamental truths have been established.

The 'cell theory.'

Fundamental truths established.

All living bodies contain substances of closely similar physical and chemical composition, which constitute the physical basis of life, known as protoplasm. So far as our present knowledge goes, this takes its origin only from pre-existing protoplasm.

All complex living bodies consist, at one period of their existence, of an aggregate of minute portions of such substance, of similar structure, called cells, each cell having its own life independent of the others, though influenced by them.

All the morphological characters of animals and plants are the results of the mode of multiplication, growth, and structural metamorphosis of these cells, considered as morphological units.

All the physiological activities of animals and plants—assimilation, secretion, excretion, motion, generation—are the expression of the activities of the cells considered as physiological units. Each individual, among the higher animals and plants, is a synthesis of millions of subordinate individualities. Its individuality, therefore, is that of a 'civitas' in the ancient sense, or that of the Leviathan of Hobbes.

There is no absolute line of demarcation between animals and plants. The intimate structure, and the modes of change, in the cells of the two are fundamentally the same. Moreover, the higher forms are evolved from lower, in the course of their development, by analogous processes of differentiation, coalescence, and reduction in both the vegetable and the animal worlds.

At the present time, the cell theory, in consequence of recent investigations into the structure and metamorphosis of the 'nucleus,' is undergoing a new development of great significance, which, among other things, foreshadows the possibility of the establishment of a physical theory of heredity, on a safer foundation than those which Buffon and Darwin have devised.

Spontaneous generation disproved.

The popular belief in abiogenesis, or the so-called 'spontaneous' generation of the lower forms of life, which was accepted by all the philosophers of antiquity, held its ground down to the middle of the seventeenth century. Notwithstanding the frequent citation of the phrase, wrongfully attributed to Harvey, 'Omne vivum ex ovo,' that great physiologist believed in spontaneous generation as firmly as Aristotle did. And it was only in the latter part

of the seventeenth century, that Redi, by simple and well-devised experiments, demonstrated that, in a great number of cases of supposed spontaneous generation, the animals which made their appearance owed their origin to the ordinary process of reproduction, and thus shook the ancient doctrine to its foundations. In the middle of the eighteenth century, it was revived, in a new form, by Needham and Buffon; but the experiments of Spallanzani enforced the conclusions of Redi, and compelled the advocates of the occurrence of spontaneous generation to seek evidence for their hypothesis only among the parasites and the lowest and minutest organisms. It is just fifty years since Schwann and others proved that, even with respect to them, the supposed evidence of abiogenesis was untrustworthy.

During the present epoch, the question, whether living matter can be produced in any other way than by the physiological activity of other living matter, has been discussed afresh with great vigour; and the problem has been investigated by experimental methods of a precision and refinement unknown to previous investigators. The result is that the evidence in favour of abiogenesis has utterly broken down, in every case which has been properly tested. So far as the lowest and minutest organisms are concerned, it has been proved that they never make their appearance, if those precautions by which their germs are certainly excluded are taken. And, in regard to parasites, every case which seemed to make for their generation from the substance of the animal, or plant, which they infest has been proved to have a totally different significance. Whether not-living matter may pass, or ever has, under any conditions, passed into living matter, without the agency of pre-existing living matter, necessarily remains an open question; all that can be said is that it does not undergo this metamorphosis under any known conditions.

Those who take a monistic view of the physical world may fairly hold abiogenesis as a pious opinion, supported by analogy and defended by our ignorance. But, as matters stand, it is equally justifiable to regard the physical world as a sort of dual monarchy. The kingdoms of living matter and of not-living matter are under one system of laws, and there is a perfect freedom of exchange and transit from one to the other. But no claim to biological nationality is valid except birth.

Morphology.

In the department of anatomy and development, a host of accurate and patient inquirers, aided by novel methods of preparation, which enable the anatomist to exhaust the details of visible structure and to reproduce them with geometrical precision, have investigated every important group of living animals and plants, no less than the fossil relics of former faunæ and floræ. An enormous addition has thus been made to our knowledge, especially of the lower forms of life, and it may be said that morphology, however inexhaustible in detail, is complete in its broad features. Classification, which is merely a convenient summary expression of morphological facts, has undergone a corresponding improvement. The breaks which formerly separated our groups from one another, as animals from plants, vertebrates from invertebrates, cryptogams from phanerogams, have either been filled up, or shown to have no theoretical significance. The question of the position of man, as an animal, has given rise to much disputation, with the result of proving that there is no anatomical or developmental character by which he is more widely distinguished from the group of animals most nearly allied to him, than they are from one another. In fact, in this particular, the classification of Linnæus has been proved to be more in accordance with the facts than those of most of his successors.

Anthropology.

The study of man, as a genus and species of the animal world, conducted with reference to no other considerations than those which would be admitted by the investigator of any other form of animal life, has given rise to a special branch of biology, known as Anthropology, which has grown with great rapidity. Numerous societies devoted to this portion of science have sprung up, and the energy of its devotees has produced a copious literature. The physical characters of the various races of men have been studied with a minuteness and accuracy heretofore unknown; and demonstrative evidence of the existence of human contemporaries of the extinct animals of the latest geological epoch has been obtained. Physical science has thus been brought into the closest relation with history and with archæology; and the striking investigations which, during our time, have put beyond doubt the vast antiquity of Babylonian and Egyptian civilisation, are in perfect harmony with the conclusions of anthropology as to the antiquity of the human species.

Classification is a logical process which consists in putting together those things which are like and keeping asunder those which are unlike; and a morphological classification, of course, takes note only of morphological likeness and unlikeness. So long, therefore, as our morphological knowledge was almost wholly confined to anatomy, the characters of groups were solely anatomical; but as the phenomena of embryology were explored, the likeness and unlikeness of individual development had to be taken into account; and, at present, the study of ancestral evolution introduces a new element of likeness and unlikeness which is not only eminently deserving of recognition, but must ultimately predominate over all others. A classification which shall represent the process of ancestral evolution is, in fact, the end which the labours

of the philosophical taxonomist must keep in view. But it is an end which cannot be attained until the progress of palæontology has given us far more insight, than we yet possess, into the historical facts of the case. Much of the speculative 'phylogeny,' which abounds among my present contemporaries, reminds me very forcibly of the speculative morphology, unchecked by a knowledge of development, which was rife in my youth. As hypothesis, suggesting inquiry in this or that direction, it is often extremely useful; but, when the product of such speculation is placed on a level with those generalisations of morphological truths which are represented by the definitions of natural groups, it tends to confuse fancy with fact and to create mere confusion. We are in danger of drifting into a new 'Natur-Philosophie' worse than the old, because there is less excuse for it. Boyle did great service to science by his 'Sceptical Chemist,' and I am inclined to think that, at the present day, a 'Sceptical Biologist' might exert an equally beneficent influence.

Physiology.

Whoso wishes to gain a clear conception of the progress of physiology, since 1837, will do well to compare Müller's 'Physiology,' which appeared in 1835, and Drapiez's edition of Richard's 'Nouveaux Eléments de Botanique,' published in 1837, with any of the present handbooks of animal and vegetable physiology. Müller's work was a masterpiece, unsurpassed since the time of Haller, and Richard's book enjoyed a great reputation at the time; but their successors transport one into a new world. That which characterises the new physiology is that it is permeated by, and indeed based upon, conceptions which, though not wholly absent, are but dawning on the minds of the older writers.

Modern physiology sets forth as its chief ends: Firstly, the ascertainment of the facts and conditions of cell-life in general. Secondly, in composite organisms, the analysis of

the functions of organs into those of the cells of which they are composed. Thirdly, the explication of the processes by which this local cell-life is directly, or indirectly, controlled and brought into relation with the life of the rest of the cells which compose the organism. Fourthly, the investigation of the phenomena of life in general, on the assumption that the physical and chemical processes which take place in the living body are of the same order as those which take place out of it; and that whatever energy is exerted in producing such phenomena is derived from the common stock of energy in the universe. In the fifth place, modern physiology investigates the relation between physical and psychical phenomena, on the assumption that molecular changes in definite portions of nervous matter stand in the relation of necessary antecedents to definite mental states and operations. The work which has been done in each of the directions here indicated is vast, and the accumulation of solid knowledge, which has been effected, is correspondingly great. For the first time in the history of science, physiologists are now in a position to say that they have arrived at clear and distinct, though by no means complete, conceptions of the manner in which the great functions of assimilation, respiration, secretion, distribution of nutriment, removal of waste products, motion, sensation, and reproduction are performed; while the operation of the nervous system, as a regulative apparatus, which influences the origination and the transmission of manifestations of activity, either within itself or in other organs, has been largely elucidated.

Practical value of physiological discovery.

I have pointed out, in an earlier part of this chapter, that the history of all branches of science proves that they must attain a considerable stage of development before they yield practical 'fruits;' and this is eminently true of physiology. It is only within the present epoch, that physiology and

chemistry have reached the point at which they could offer a scientific foundation to agriculture; and it is only within the present epoch, that zoology and physiology have yielded any very great aid to pathology and hygiene. But, within that time, they have already rendered highly important services by the exploration of the phenomena of parasitism. Not only have the history of the animal parasites, such as the tapeworms and the trichina, which infest men and animals, with deadly results, been cleared up by means of experimental investigations, and efficient modes of prevention deduced from the data so obtained; but the terrible agency of the parasitic fungi and of the infinitesimally minute microbes, which work far greater havoc among plants and animals, has been brought to light. The 'particulate' or 'germ' theory of disease, as it is called, long since suggested, has obtained a firm foundation, in so far as it has been proved to be true in respect of sundry epidemic disorders. Moreover, it has theoretically justified prophylactic measures, such as vaccination, which formerly rested on a merely empirical basis; and it has been extended to other diseases with excellent results. Further, just as the discovery of the cause of scabies proved the absurdity of many of the old prescriptions for the prevention and treatment of that disease; so the discovery of the cause of splenic fever, and other such maladies, has given a new direction to prophylactic and curative measures against the worst scourges of humanity. Unless the fanaticism of philozoic sentiment overpowers the voice of philanthropy, and the love of dogs and cats supersedes that of one's neighbour, the progress of experimental physiology and pathology will, indubitably, in course of time, place medicine and hygiene upon a rational basis. Two centuries ago England was devastated by the plague; cleanliness and common sense were enough to free us from its ravages. One century

since, small-pox was almost as great a scourge; science, though working empirically, and almost in the dark, has reduced that evil to relative insignificance. At the present time, science, working in the light of clear knowledge, has attacked splenic fever and has beaten it; it is attacking hydrophobia with no mean promise of success; sooner or later it will deal, in the same way, with diphtheria, typhoid and scarlet fever. To one who has seen half a street swept clear of its children, or has lost his own by these horrible pestilences, passing one's offspring through the fire to Moloch seems humanity, compared with the proposal to deprive them of half their chances of health and life because of the discomfort to dogs and cats, rabbits and frogs, which may be involved in the search for means of guarding them.

Scientific exploration.

An immense extension has been effected in our knowledge of the distribution of plants and animals; and the elucidation of the causes which have brought about that distribution has been greatly advanced. The establishment of meteorological observations by all civilised nations, has furnished a solid foundation to climatology; while a growing sense of the importance of the influence of the 'struggle for existence' affords a wholesome check to the tendency to overrate the influence of climate on distribution. Expeditions, such as that of the 'Challenger,' equipped, not for geographical exploration and discovery, but for the purpose of throwing light on problems of physical and biological science, have been sent out by our own and other Governments, and have obtained stores of information of the greatest value. For the first time, we are in possession of something like precise knowledge of the physical features of the deep seas, and of the living population of the floor of the ocean. The careful and exhaustive study of the phenomena presented by the accumulations of snow and ice, in polar and

mountainous regions, which has taken place in our time, has not only revealed to the geologist an agent of denudation and transport, which has slowly and quietly produced effects, formerly confidently referred to diluvial catastrophes, but it has suggested new methods of accounting for various puzzling facts of distribution.

Palæontology.

Palæontology, which treats of the extinct forms of life and their succession and distribution upon our globe, a branch of science which could hardly be said to exist a century ago, has undergone a wonderful development in our epoch. In some groups of animals and plants, the extinct representatives, already known, are more numerous and important than the living. There can be no doubt that the existing Fauna and Flora is but the last term of a long series of equally numerous contemporary species, which have succeeded one another, by the slow and gradual substitution of species for species, in the vast interval of time which has elapsed between the deposition of the earliest fossiliferous strata and the present day. There is no reasonable ground for believing that the oldest remains yet obtained carry us even near the beginnings of life. The impressive warnings of Lyell against hasty speculations, based upon negative evidence, have been fully justified; time after time, highly organised types have been discovered in formations of an age in which the existence of such forms of life had been confidently declared to be impossible. The western territories of the United States alone have yielded a world of extinct animal forms, undreamed of fifty years ago. And, wherever sufficiently numerous series of the remains of any given group, which has endured for a long space of time, are carefully examined, their morphological relations are never in discordance with the requirements of the doctrine of evolution, and often afford convincing evidence of it. At the same time, it has been shown that

certain forms persist with very little change, from the oldest to the newest fossiliferous formations; and thus show that progressive development is a contingent, and not a necessary result, of the nature of living matter.

Geology. Geology is, as it were, the biology of our planet as a whole. In so far as it comprises the surface configuration and the inner structure of the earth, it answers to morphology; in so far as it studies changes of condition and their causes, it corresponds with physiology; in so far as it deals with the causes which have effected the progress of the earth from its earliest to its present state, it forms part of the general doctrine of evolution. An interesting contrast between the geology of the present day and that of half a century ago, is presented by the complete emancipation of the modern geologist from the controlling and perverting influence of theology, all-powerful at the earlier date. As the geologist of my young days wrote, he had one eye upon fact, and the other on Genesis; at present, he wisely keeps both eyes on fact, and ignores the pentateuchal mythology altogether. The publication of the 'Principles of Geology' brought upon its illustrious author a period of social ostracism; the instruction given to our children is based upon those principles. Whewell had the courage to attack Lyell's fundamental assumption (which surely is a dictate of common sense) that we ought to exhaust known causes before seeking for the explanation of geological phenomena in causes of which we have no experience. But geology has advanced to its present state by working from Lyell's[1] axiom; and, to this day, the record of the stratified rocks affords no proof that the intensity or the rapidity of

[1] Perhaps I ought rather to say Buffon's axiom. For that great naturalist and writer embodied the principles of sound geology in a pithy phrase of the *Théorie de la Terre*: 'Pour juger de ce qui est arrivé, et même de ce qui arrivera, nous n'avons qu'à examiner ce qui arrive.'

the causes of change has ever varied, between wider limits, than those between which the operations of nature have taken place in the youngest geological epochs.

An incalculable benefit has accrued to geological science from the accurate and detailed surveys, which have now been executed by skilled geologists employed by the Governments of all parts of the civilised world. In geology, the study of large maps is as important as it is said to be in politics; and sections, on a true scale, are even more important, in so far as they are essential to the apprehension of the extraordinary insignificance of geological perturbations in relation to the whole mass of our planet. It should never be forgotten that what we call 'catastrophes,' are, in relation to the earth, changes, the equivalents of which would be well represented by the development of a few pimples, or the scratch of a pin, on a man's head. Vast regions of the earth's surface remain geologically unknown; but the area already fairly explored is many times greater than it was in 1837; and, in many parts of Europe and the United States, the structure of the superficial crust of the earth has been investigated with great minuteness.

The parallel between Biology and Geology, which I have drawn, is further illustrated by the modern growth of that branch of the science known as Petrology, which answers to Histology, and has made the microscope as essential an instrument to the geological as to the biological investigator.

The evidence of the importance of causes now in operation has been wonderfully enlarged by the study of glacial phenomena; by that of earthquakes and volcanoes; and by that of the efficacy of heat and cold, wind, rain, and rivers as agents of denudation and transport. On the other hand, the exploration of coral reefs and of the deposits now taking place at the bottom of the great oceans, has proved that, in

animal and plant life, we have agents of reconstruction of a potency hitherto unsuspected.

There is no study better fitted than that of geology to impress upon men of general culture that conviction of the unbroken sequence of the order of natural phenomena, throughout the duration of the universe, which is the great, and perhaps the most important, effect of the increase of natural knowledge.

T. H. HUXLEY.

MEDICINE AND SURGERY.

Introduction.

I HAVE been asked to write a brief account of the progress of medicine and surgery during the reign of her Majesty the Queen.[1] That progress has been so vast in its amount, and has been brought about by improvements in so many matters of detail, as well as by the establishment of so many principles, that no one could hope, except after years of labour, to compose a history of it which should be at once symmetrical in its proportions and complete in its extent. Fortunately, no such undertaking is required on the present occasion; but only that I should set down, in a manner intelligible to non-medical readers, the chief advances which have been made in the application of science to the arts of restoring health and of promoting longevity. From what pains, which our ancestors were compelled to suffer, have we obtained exemption; and from what maladies, which proved fatal to them, have we the means of protecting ourselves? If the replies to these questions could be given in all their fullness, they would constitute a record which no other department of human activity could surpass, and which, in all probability, no other could approach.

Statistics.

Some appreciation of what has been done may possibly be obtained from a statement of aggregate results. Lord

[1] Partly from the fear of accidentally omitting some who have claims to be remembered, and partly in deference to a feeling which is universal among the members of the higher ranks of the medical profession, I have

Macaulay, in his description of England under the Stuarts, tells us that in the year 1685, which was not accounted sickly, more than one in twenty-three of the inhabitants of the capital died; but that when he wrote, say in 1845, only one inhabitant of the capital in forty died annually. In the middle of 1885 the estimated population of London was 4,083,928 persons, and the deaths registered during the year were exactly 80,000; so that, in the space of forty years, the average annual metropolitan mortality was reduced from the death of one inhabitant in forty to that of one in fifty-one, a reduction not very far short of that of the previous one hundred and sixty years, and effected notwithstanding the opposing influence of an enormous increase of population. In the five years from 1838 to 1842, London had an average population of 1,840,865 persons, and an average annual mortality of 2,557 in every hundred thousand. In the five years 1880 to 1884, London had an average population of 3,894,261, and an average annual mortality of 2,101 in every hundred thousand. If the rate of mortality in the second of these periods had been the same as in the first, 17,328 people would have died in the metropolis in each of the five years, who, as events actually occurred, were preserved alive. Of London.

It is not possible, either for London or for the country generally, to compare the mortality of the time of her Majesty's accession with that of the present day, because the necessary materials do not exist. The Act which provided for civil registration came into operation a few weeks after her Majesty ascended the throne, and 1838 was the first complete year in which its provisions were carried out. The best course which circumstances permit is to compare

abstained from any mention of the names of living practitioners. The names of the dead have been mentioned freely, and also those of official persons who are not practitioners.

two periods, say that from 1838 to 1847 with that from 1876 to 1885.

Of England and Wales.

The mean annual death-rate for England and Wales, from 1838 to 1847, was 22·16 per thousand; and the mean annual death-rate from 1876 to 1885 was 20·07 per thousand. If the mortality in the latter period had been as high as in the former, the deaths would have been more numerous than they were by over half a million, or, to speak precisely, by 550,191. In the year 1885, taken alone, the death-rate for England and Wales was 19·0 per thousand, which, on an estimated population of 27,000,000, implies that the deaths were less by 48,900 than the average annual number during the decennium which the year in question brought to a close.

Of army and navy.

While such has been the diminution of mortality for the whole nation, the diminution for the naval and military services, both in peace and war, has been even more remarkable. The earliest figures to which I have access for the Navy relate to the year 1859, in which, among a force of 52,825 men, there was a death-rate of 16·7 per thousand. This was pronounced by the authorities to be 'most satisfactory,' as compared with the figures for the preceding year, and was a great improvement on those of earlier times. During the ten years 1875–84, the average annual naval death-rate was 9·63 per thousand; and the rate for 1885, on a force of 46,670, was only 7·04 per thousand. The average annual mortality in the Foot Guards, between the years 1826 and 1846, was 20·5 per thousand, or more than double that of the total male population within the same limits of age; and this excess was chiefly due to the insanitary state of barracks and guard-rooms. In the year 1884, the mortality among the Foot Guards was 8·27 per thousand, or 1·96 per thousand below that of all males of corresponding ages, but was 2·94 higher than that of all

arms in the United Kingdom for the same year, and 0·74 higher than that of all arms for the ten years 1874–83. In the Crimean war, exclusive of men killed in action, we lost 1,761 from wounds and 16,297 from disease; 10 per cent. of the whole invading force having died from disease in the single month of January 1855. In Egypt, in 1882, from July 17 to October 19, out of an average strength of 13,013, with 7,590 admissions into hospital, there were only 79 deaths from wounds and disease; and, out of 1,500 cases of inflamed eyes, not one man lost his sight. In 1885, between March 1 and May 14, there were only 17 deaths among the Suakim expedition of 9,944 men, with 2,047 admissions to hospital; and in the first Suakim expedition, from February 15 to April 6, 1884, with an average strength of 4,018, and with 314 admissions to hospital, there were no deaths at all. In India, the annual average mortality of British troops, which had previously been about 69 per thousand, was reduced in ten years, by the adoption of the recommendations of the Sanitary Commission of 1860, to about 17 per thousand; and the number of men constantly sick from about 10 to about 5 per cent. of strength.

Difficulty of dividing results between preventive and curative medicine.

It would be very satisfactory, if the necessary data could be supplied, to distribute the total saving of life under different headings, and to show by what means it has been brought about. A definite proportion must be attributable to preventive medicine, and a definite proportion to curative medicine; but it is impossible to say what these proportions are. The earlier returns of the causes of death were often inaccurate; and, even now, they are not entirely to be relied upon. We have no means of ascertaining what has been the actual prevalence of any form of disease, or of determining whether a diminished mortality has been due to the occurrence of a smaller number of cases or to a

lessened death-rate among those which have occurred. The diminution of mortality from typhoid fever, for example, may probably be referred to both these causes, and partly also to a more correct discrimination of typhoid from other kinds of illness; but there are no materials from which even to infer the share of each cause in the production of the general result.

Other difficulties.

Besides these obvious difficulties there are others, arising from the fact that the saving of life has been unequal among classes who, it would be thought, could hardly fail to be equally influenced by the causes to which the improvement must be attributed. There has, generally speaking, been a greater diminution of mortality among females than among males; and the diminution has been greater among children and young persons than among persons of riper years. There has even been an increase of mortality among males at the later age periods (after 35), and among females between the ages of 55 and 75. How far these conditions may be due to the comparatively premature death, as adults, of some who would previously have died as children, and who, although preserved, have not been preserved to attain longevity; how far to differences of habit, of education, or of employment; and how far to the stress of modern life, are questions which must be answered by the statisticians of the future. We cannot avoid perceiving that these questions exist, or that some of them may hereafter come into prominence; but the materials for replying to them are not now in our possession. It is none the less true that medicine has, during the last ten years, saved more than half a million of lives in England and Wales in excess of the saving which it effected between 1838 and 1847; or that it effected a saving, smaller indeed, but still considerable, in each of the three intermediate decades; and these facts afford a sufficient founda-

tion for the claim of activity and usefulness which I have advanced.

Preventive medicine.

It being impracticable to assign the respective shares of preventive and of curative medicine in the production of the general result, it will be admitted that, so far as this narrative is concerned, the former is entitled to precedence. It has been developed, in the course of fifty years, from a collection of vague hypotheses and sanguine hopes into an active force in daily and beneficent operation.

Causation of disease.

It is probable that all primitive races have attributed disease to the displeasure of supernatural beings; and this belief has been fostered by many priesthoods, partly from genuine assent, and partly, perhaps, from other motives. In ancient communities which attained a high degree of learning and civilisation the primitive belief was often superseded by a more reasonable one; but this, generally speaking, was confined within narrow circles, and did not reach the ignorant and the vulgar. Much of the law of Moses was evidently dictated by his desire to preserve the health of the people under his command; and it may therefore be inferred, not only that he had acquired, as part of 'the learning of the Egyptians,' some insight into the principles of sanitary science, but also that he knew the uselessness of communicating these principles to his followers in any other form than as rules, independent of reason, which were to be obeyed without question as divine commands. The superstition which Moses turned to good purpose constitutes a powerful agency even in our own time; but, notwithstanding its continued existence, we may believe that an approximately accurate conception of the nature of disease has at length been very generally attained.

Natural explanation.

It will now, I apprehend, be conceded by all educated persons that illness and death are links in a chain of natural

phenomena, and that their causes, although often concealed from us by want of knowledge, are always related to something which has gone before, either in the life of the individual or in the lives of his progenitors. If a soldier falls in battle, when under the fire of the enemy, we infer that he has been struck by a bullet; and if a civilian falls a victim to typhoid fever, we infer that he has inhaled or swallowed a particle of the poison of the disease. We know that, if we had stopped the firing in the one case and the liberation of the poison in the other, the soldier and the civilian would no longer have been exposed to a danger which, if permitted to continue, must necessarily prove fatal to some individuals. If a man so lives, either from choice or necessity, that the demands upon his tissues are more than they can sustain, and that waste exceeds repair, we know that he will die sooner than if his life were more correctly ordered. We cannot foresee when or how the end will come, because we cannot tell what kind of force will first present itself for his extinction; but we know that the event is sure, by whatever steps it may be brought about. We know that if, when himself weakened or diseased, the man becomes a parent, his offspring will be liable to inherit his disease or his weakness; and we are acquainted with two courses of events, one of which will frequently occur. Either the family, in successive generations, will suffer less and less from and will ultimately overcome the inherited disease, or the disease will gain ground and eventually extinguish the family. We do not yet know how these events are determined, nor can we explain how it is that inherited disease or weakness may pass over a generation, or even two or more generations, and may ultimately reappear; but we are none the less familiar with such occurrences as matters of experience.

Such views as these were held by a few people, not only

in 1837, but even in much earlier times, when they rested on imperfect evidence. But it was the custom fifty years ago, among the great majority of the English middle classes, to take no heed of the sanitary condition of the places in which they lived and brought up their children, and to attribute not only the occurrence of disease, but also its issue in each individual case, to the direct personal will of the Creator of the universe. With such a state of opinion there could be little hope of improvement.

Sanitary neglect fifty years ago.

The first step towards a much-needed reform was taken by the Poor Law Commissioners, who in 1838, and again in 1839, presented to the Government reports from physicians on preventible causes of disease in the metropolis. In the last-named year, and in consequence of these reports, the House of Lords addressed the Crown, praying that an inquiry might be instituted as to how far similar causes of disease were in operation in other parts of England and Wales; and the Poor Law Commissioners were directed to undertake this inquiry. Assistant-commissioners were appointed to visit various districts, and in 1840 the investigation was extended to Scotland. A report, drawn up by Mr. Edwin Chadwick, C.B., was presented to Parliament on July 9, 1842, and, together with the reports of the assistant-commissioners, was immediately published. These reports proved that the time had come when measures for the sanitary improvement of the people could no longer be neglected; and, after the usual delays, they led, in 1848, to the passage of Acts which form the basis of all modern sanitary legislation.

First step towards reform.

Inquiry by Poor Law Commissioners.

Legislation.

At the time when these Acts were framed, the hopes of sanitary reformers were fixed upon the attainment of a higher degree of national cleanliness, and their knowledge, or even their imaginings, did not go beyond the conception that dirt and overcrowding were causes of disease. The

Expectations of sanitary reformers.

differentiation of the various kinds of dirt on the one hand, or of the various diseases on the other, scarcely entered into their calculations. The returns of the Registrar-General, then beginning to become available, speedily showed a diminution of mortality in places in which increased cleanliness had been obtained; and it was felt that the new 'General Board of Health' had fairly commenced a great and beneficial national undertaking.

Medical officers of health. Mr. Simon.

In the meanwhile, the Acts had empowered local authorities in certain places to appoint 'medical officers of health,' and the City of London led the way by so appointing Mr. John Simon, F.R.S., one of the surgeons to St. Thomas's Hospital, and already highly distinguished as a scientific pathologist. Mr. Simon early saw that contagious emanations proceeding from the sick must consist of definite particles, since they obeyed the laws of definite particles and no others; and that these particles must differ among themselves, being in every case peculiar to the disease which alone produced them, and which alone they could reproduce. He saw that this doctrine, if established, would greatly increase the definiteness and the success of measures of sanitary reform; and he diligently pursued any lines of investigation by which its correctness might be tested. In 1857, being appointed chief medical officer to the Privy Council, he became able to carry out his researches on a more extended scale, and with the help of skilled coadjutors; and the same opportunities were continued to him when his office was merged in that of chief medical officer to the Local Government Board, which he held from 1871 until his retirement from the public service in 1876. In the course of his long official life, he succeeded in establishing all the main points for which he had contended, and also in indicating methods by which the public health might be improved in an extraordinary degree.

Effects of sanitary improvements.

The original sanitary legislation, under the guidance of the experience gradually gained of its beneficial effects, was from time to time extended and enlarged in various ways; and fresh and important powers were conferred upon the Privy Council in 1858. Seven years afterwards, Mr. Simon instructed Dr. Buchanan, then one of the medical inspectors of the Privy Council, and now chief medical officer of the Local Government Board, to ascertain the results which had been produced in several parts of England by various improvements. Dr. Buchanan's investigations were conducted in the course of 1865–66, and he visited twenty-five towns, selected, after consultation with the Local Government Act Office, as being places where structural sanitary works had been most thoroughly done and had been longest in operation. The towns were not chosen for any previously ascertained improvement in the health of their inhabitants, and they contained an aggregate population of 606,186 persons according to the census of 1861. The improvements effected in these towns had been various and variously combined, but they chiefly consisted of improved drainage, improved water supply, improved paving and scavenging, the better removal of refuse, and the prevention of overcrowding. Wherever sanitary works of adequate character had been sufficiently long completed for their results to be displayed, Dr. Buchanan found such diminutions in the death-rates from all causes as 16, 18, 20, and in two instances even 32 per cent. The death-rates from typhoid fever had been reduced in a more marked degree than the death-rates generally, the reduction ranging from 52 to 75 per cent. in nine towns, and from 33 to 48 per cent. in ten others—a result which seemed to depend upon the purification of air, water, and earth from the emanations given off by decaying organic matter. A similar and nearly equal reduction in the mortality from consumption,

ranging in eleven towns from 20 to 49 per cent., was found to be connected with the degree in which the sanitary works had produced an increased dryness of the subsoil.

Connection between different causes and different diseases.

In this way, while a general connection between sanitary improvements and diminished mortality was rendered obvious, and a special connection between particular kinds of improvement and the diminished mortality from particular diseases was also rendered obvious, the latter element in the case had been brought into prominence in two different directions. In 1849, Dr. Snow showed that a localised outburst of cholera in the metropolis, which destroyed 616 lives in the vicinity of Golden Square, had been caused by drinking the polluted water supplied by a single pump; and, in 1857, Dr. William Budd showed that typhoid fever was not in any sense a product of filth, but a product of contagion, which, constantly emanating from sewers, cesspools, middens, and sources of water-supply contaminated by them, was yet always to be traced back, through the sewer, cesspool, or midden, to the infected person whose excretions had been received by it. Confirmatory evidence was soon obtained with regard to both diseases: with regard to cholera by the researches of Mr. Netten Radcliffe into the history of a limited outbreak at Theydon Bois, and into that of an extensive one which was produced by a distribution of infected water by one of the metropolitan companies; and, with regard to typhoid, by several analogous investigations of the precise circumstances of limited outbreaks. Some of the latter were found to be connected with a particular source of milk supply; and, in these instances, the passage of typhoid poison into a cesspool, and percolation from the latter into the well which furnished the water admittedly used for 'rinsing the pails,' and possibly also for dilution, was in every case clearly established.

Such evidence as the foregoing was sufficient to convince

all instructed physicians or pathologists of the correctness of Mr. Simon's main proposition, that the contagia of different diseases are essentially different in their nature, and that the measures which are eminently protective against one may be absolutely useless against another. The corollary of this conclusion is that the first step towards obtaining protection against any disease is to get behind its obvious manifestations to its essential phenomena and its life-history. For this purpose, the medical inspectors of the Privy Council or Local Government Board, under the direction of Mr. Simon, were employed in all parts of England in investigating, with unremitting diligence and rare acumen, the actual facts of local epidemics of all kinds; and researches of a still more delicate character, requiring all the resources of the microscope and of the laboratory, were conducted with a view to determine the actual nature and cause of each infectious disease, and the conditions and limits of its communicability. M. Pasteur had shown that some of the most fatal diseases of the lower animals were associated with the growth of minute living organisms (bacteria) in their tissues; that these bacteria might be reproduced by cultivation, either in the animal body or upon suitable materials external to it; that, when introduced into a healthy body by inoculation, they might set up the form of disease ordinarily associated with their presence; and that their properties might be so modified by different methods of cultivation as either to increase or diminish the virulence of their activity. In the latter case they might produce the characteristic disease in so mild a form as not to be dangerous to the life of the infected person or animal, but yet, presumably by the exhaustion of their own pabulum within the system, to afford protection against future attacks. A protective influence, with which we were practically familiar as displayed in the results of

Difference between contagia.

vaccination, was thus shown to rest upon a far-reaching principle.

Researches of M. Pasteur.

Bacteria.

The researches of M. Pasteur, and the brilliant success which followed his protective inoculations against the malignant anthrax of cattle, were sufficient to induce many observers to enter upon a search for specific bacteria in a great variety of diseases. The search is an exceedingly difficult one, the bacteria themselves being of extreme minuteness, and differing from each other by characters which may easily be mistaken, or to which undue significance may be assigned. It has been conclusively shown that some diseases are traceable to these organisms, but attempts to trace others to them have so far ended in failure. It is believed by those best qualified to express an opinion that the varieties of bacteria are extremely numerous, that they play an important and hitherto unappreciated part in the economy of nature, and that the best antidotes to those which are injurious may possibly be found in the operation of others. The whole question is only beginning to take shape and outline, and it would be useless to attempt to forecast conclusions which may hereafter be attained. Among the diseased conditions in the causation of which bacteria seem to hold a prominent place, must be mentioned some of the consequences of septic (or putrefactive) poisoning by accidental or designed inoculation. It is extensively believed that such inoculation may be produced by the presence in the atmosphere, and hence by the introduction into wounds, of bacterial germs; especially when, as in hospitals, the atmosphere is exposed to contamination by matters proceeding from the bodies of the sick. The most recent researches, however, rather indicate that the injurious effects of germ inoculation, and of the consequent bacterial growth, are not so much due to the mere presence of these bodies, or to any direct influence

which they exert, as to chemical changes in the blood which they serve to originate, and which may afterwards be continued independently of them.

Poisonous products of decomposition.

It has long been known that the recently dead human body may contain something which is capable of producing, when inoculated upon the healthy, dangerous or fatal illness; and that this noxious character may be destroyed by the further progress of decomposition. The conditions of such occurrences have lately been elucidated by chemical investigations into the nature of the poisonous products found in the dead body; and we are believing, at all events provisionally, that these products belong to the class of alkaloids, and that they are the results of processes which occur also during life. In other words, the expenditure of force in living is attended by the formation of substances which are poisonous, but which are constantly removed by being burnt off by the oxygen which enters the blood in respiration. It is probable that overcrowding, by diminishing the supply of oxygen for each individual, may tend, by interfering with the destruction of these poisonous products, to bring about a state of lowered vitality and of diminished power to resist infection. There is also reason to believe that its effects may be carried still farther, and that typhus fever, which is always liable to break out among underfed and overcrowded communities, may be developed within the first victims by self-poisoning, although it will afterwards spread by contagion. Typhus is the gaol fever of the Middle Ages, and its last important appearance in the United Kingdom was in Ireland during the famine consequent upon the failure of the potato.

Of living.

Limited utility of sanitary works.

The reforms which were the outcome of the legislation commenced in 1848, and the chief results of which, as then apparent, were described by Dr. Buchanan twenty years ago, were accomplished by works of construction

undertaken by local and non-medical 'sanitary authorities,' and carried out, of course, by architects, engineers, and surveyors. These gentlemen, although wanting the medical knowledge which discriminates between different diseases, were deeply impressed by the diminished mortality and improved health which followed their proceedings, and, in too many instances, fell into the error of supposing that they had mastered the whole field of sanitary science, that doctors were no longer required for its advancement, and that a pure and protected water-supply, sound and dry pavements, properly constructed sewers, and well-built dwellings with sufficient cubic space, comprised everything necessary to preserve the health of a community. These things were, indeed, of high importance. They afforded protection against the dissemination of disease through certain channels; they diminished the death-rate from typhoid fever, contagious diarrhœal maladies, and consumption; and they rendered the population better able to resist any injurious influence to which they might be exposed. But, notwithstanding the wide range and the beneficial character of their effects, these reforms, if they had stood alone, would have left the prevalence of many common maladies undiminished and uncontrolled. Fortunately for the country, such an abortive result has been in great measure prevented by the medical department which was attached, in the first instance, to the Privy Council, and afterwards to the Local Government Board. The inspectors of this department, the staff-officers of a new army of sanitary workers, under the guidance of their successive chiefs, have offered for the acceptance of every sanitary authority in the kingdom a mass of information gained from the experience of the country at large; often gained in processes of search as to the origin of local epidemics, and as to weak places in local sanitary defences;

Medical Department of Privy Council and Local Government Board.

and they are to be credited with having organised that system of protection against cholera which, without subjecting the healthy to restraint and without recourse to the absurdities of quarantine, has sufficed to keep Great Britain scatheless. The same inspectors have lately been charged with the duty of seeing how far the national defences are in readiness; and, although too many flaws were discoverable by their practised eyes, they report so much of amendment as to enable us to hope that foreign pestilences may henceforth prove harmless to our country.

Discharge of contagia by definite channels.

It is true of nearly every infectious disease that the infectious matter which it produces is thrown off from the bodies of the sick chiefly, if not entirely, through a single definite channel. In the case of typhoid fever, cholera, and the infectious diarrhœal maladies, this channel is the intestinal canal; and the diseases are mainly spread by the intestinal discharges. These, in former times, were constantly so disposed of that they either percolated into wells or watercourses, or became dried and were distributed through the atmosphere. The architect or the engineer, acting under medical guidance, and by means of well-constructed sewerage arrangements and protected water channels, may do much to prevent these discharges from inflicting injury, but the knowledge of the physician is required in order still further to diminish danger. The discharges themselves should be chemically disinfected before they are taken away from the sick chamber; and physicians have gained in recent years much knowledge of valid disinfection, and are gaining more.

Diseases in which these channels are unknown.

Besides the foregoing group, there are other forms of epidemic disease current in England, notably scarlet fever, diphtheria, measles, and hooping-cough, each of which is productive of a large mortality. The causes of the two former, although now more than surmised, are hardly fully

known; while the causes of the two latter, and the methods of dissemination of all, may almost be described as unknown. 'Sanitary measures,' as understood by architects and local authorities, have no manifest influence upon them. As regards communication from person to person, diphtheria appears to be capriciously and uncertainly infective; the other three are highly infective. In all of them the nature and channels of discharge of the infective material are unknown, and the chief agency which can be employed to prevent their diffusion is the isolation of the sick. But, in the common condition of ignorance about sanitary matters, it is hardly possible for an epidemic of scarlet fever, of diphtheria, of measles, or of hooping-cough to occur anywhere without a bitter complaint of the state of the local drainage, or of the existence of a local 'bad smell,' being made by some enthusiastic non-medical sanitarian; and it is generally useless to tell such a complainant that, as far as is known to physicians, bad drainage and bad smells, however objectionable on other grounds, have no discoverable relation to the prevalence of the malady. It has been almost proved, during the last two or three years, that diphtheria has been produced by drinking the milk of a cow affected by a disease which in that animal is of an unimportant character; and so lately as last year scarlet fever was even more certainly traced to a similar origin. It has long been known that scarlet fever often follows some given source of milk-supply; but, in these instances, it has frequently happened that the sellers or carriers of the milk were the first persons to suffer, perhaps only in a slight degree, and that they were active in the work of preparation and distribution while still infective, so that they were supposed to be themselves the means by which the disease was conveyed to the families of purchasers. It was also conjectured that scarlet fever, like typhoid, might be com-

Milk as a cause of diphtheria,

municated through the medium of the water used for dairy purposes; but a difficulty was placed in the way of accepting this conjecture by the fact that no undoubted example of the conveyance of scarlet fever by the agency of water could be traced. Mr. Power, of the Local Government Board, has lately conducted investigations which seem to prove that scarlet fever may be produced by drinking the milk of cows with ulcerated udders, the secretion from which has fallen into the pails; so that presumably the cows, and neither water adulteration nor the persons of the distributors, have been the sources of some very destructive epidemics. If this be fully established, it will rank among the greatest discoveries of the Jubilee year. During the period between 1851 and 1880 scarlet fever annually destroyed the lives, in England and Wales, of an average of 854 persons for every million living, which proportion, on the estimated population of the kingdom, would mean a total of 543,000 deaths in the thirty years, mostly among young persons, with prospects of life and usefulness before them. It is not too much to say that each death would mean twelve illnesses, many of them with injurious consequences of lifelong duration, and that each illness would cost a pound—an estimate which roughly sets the pecuniary loss inflicted upon the nation by scarlet fever in thirty years at over six millions sterling, without considering the anxiety and suffering of parents and relatives. To know the cause of all this misery would imply the power of preventing it in the future.

and of scarlet fever.

The prospect thus afforded, and the high probability that both scarlet fever and diphtheria are produced by the diseases of cows, furnish a striking illustration of the folly of resting upon the so-called 'sanitary measures' which can be carried into effect by persons not possessed of medical knowledge, and which are only useful against particular forms

Isolation, imperfect provision for.

of disease. Notwithstanding the manifest value of public cleanliness, the pursuit of it is sometimes regarded as an excuse for the neglect of precautions at least equally important—such, for example, as the isolation of the sick. The necessity for isolation in diseases which are infective through unknown channels has long been pointed out by physicians, but is hardly understood by the community; so that both law and custom permit freedoms which are incompatible with the general safety. Much has been done to diffuse knowledge on this subject, but much remains to do; and many, who are convinced of the necessity of isolating infectious disease when it occurs among their neighbours, hold the belief less firmly when members of their own families are the sufferers. The use of public conveyances by infected persons is only nominally forbidden; while schools, laundries, and workshops are not yet placed under any sufficient control, and frequently become centres from which contagion may radiate. The recent provision of ambulances for the conveyance of infected persons is an important step in the right direction, and can hardly fail to exert a beneficial educational influence.

Small-pox and vaccination.

The case of small-pox stands apart from that of other infectious diseases, on account of the protection afforded by vaccination; and it is therefore desirable to mention the steps by which this protection has been extended. Prior to 1840, persons who were not paupers, and who wished their children to be vaccinated, had to pay a medical practitioner for the performance of the operation, and to trust to him for its being performed safely and effectually. In 1840 vaccination was provided gratuitously, apart from parochial relief, and this state of things continued until the end of 1853. From 1854 to 1871 vaccination was declared to be obligatory, but was not enforced; and from 1872 to the present time it has not only been obligatory, but has been

so far enforced that only some five or six per cent. of births are now left unaccounted for. At the same time, the medical inspectors of the Privy Council, or of the Local Government Board, have been very successful in raising the previously accepted standards of quality and efficiency. For the last few years about three-quarters of a million of children have been vaccinated every year, and the deaths registered as consequent upon vaccination have been about fifty annually. These deaths, as far as can be ascertained by careful inquiry, have mostly been due to blood-poisoning through the scratch, and hence to some form of what is called pyæmia, septicæmia, or erysipelas; possibly due in some instances to the use of an unclean vaccinating instrument; possibly in some to a constitutional peculiarity on the part of the vaccinated child; and in some, it can hardly be doubted, to accidental inoculation with septic matter after the child had returned to its home. During the same period, the deaths registered among children under one year old from pyæmia, septicæmia, erysipelas, and blood-poisoning, independent of vaccination, have amounted to about five hundred annually. In other words, for every vaccination scratch which has led to any of these disasters, ten accidental injuries have done the same thing.

Influence of vaccination

With regard to the influence of vaccination in preventing small-pox, that influence is very conspicuous in the case of children and young people, for whose protection the law is chiefly operative, and is also conspicuous, but in a less degree, in the case of adults. During the first decade of the Queen's reign, in a population roughly of sixteen millions, the deaths registered as from small-pox in England and Wales amounted to 11,462; and during the last decade, in a population roughly of twenty-six millions, to 9,855, or half what they would have been if the former proportion had been maintained. It has been shown that the mor-

tality among children, in the metropolitan epidemic of 1881, would, if it had been in accordance with former experience, or with that among the unvaccinated, have exceeded the actual mortality by 12,000. In the same year, the deaths from small-pox among the relatively few unvaccinated children of London are stated by Dr. Buchanan to have been very nearly ten times as many as those among the twentyfold larger number of vaccinated children, the rate of mortality in the two classes differing as 200 to 1. It will probably be correct to say that the protection afforded by vaccination does not endure so long as that afforded by small-pox, but that the former can always be renewed by revaccination. The law provides for the safety of infants, who cannot protect themselves, but is somewhat inconsistent in allowing adults to catch and to spread small-pox at their pleasure. In Germany the latter freedoms are no longer permitted, and revaccination is enforced. It is noteworthy that the small-pox mortality of recent years has been almost entirely metropolitan, and that in the provinces the deaths from the disease have fallen to very insignificant numbers.

on children,

on adults.

Hydrophobia.

It is necessary to mention, as a proceeding analogous to vaccination, the means by which M. Pasteur hopes to confer immunity from hydrophobia. The principle on which his treatment rests is that of producing by inoculation a change which renders the subject of it no longer susceptible of the operation of a particular virus. It would be impossible at present to speak with entire confidence about the probable future of the process; for something has still to be learnt as to the degree of attenuation in which the inoculated matter should be applied, and as to other details. So far, although the experiments have not been free from misadventure, the results have been such as to encourage hope that the anticipations of the illustrious French *savant* will prove to have been well founded.

Industrial maladies.

In addition to the gains already described, great progress has been made, chiefly through researches conducted by medical inspectors of the Local Government Board, in our knowledge of maladies due to conditions peculiar to certain industries, and of means by which the workers in these industries may be protected. The inhalation of dust in various forms has been shown to be productive of lung disease; the handling of the hides or wool of diseased animals to have been a cause of fatal malignant pustule; and the use of noxious materials—lead, phosphorus, and others—has been found to produce injurious consequences of various kinds. Against these evils, in the majority of instances, methods of protection have been devised.

General result of preventive medicine.

The continuous advancement of preventive medicine has occasioned the saving of a large sum of human life, much of it, no doubt, of a highly valuable description; but it may reasonably be asked whether this saving has been an unmixed gain to the community. I have pointed out the possibility that some who are saved from dying in childhood may yet not be saved to attain longevity; and this may mean the existence amongst us, during a period long enough for them to propagate their kind, of a greater number of weakly or diseased organisms than could have been found at former periods of our history. It is possible that the country may have uses for the greater quantity of young adult life which it thus obtains; even though every such individual, after reaching manhood or womanhood, may die sooner than the average of survivors when the former rates of mortality prevailed. It is difficult to say whether the national interests would be best served, in the long run, by permitting feeble organisations to perish in childhood, or by giving them such chances as prolonged life and better surroundings may afford of ultimately, in themselves or their descendants, outgrowing their original weaknesses.

The same problem overhangs much which passes muster for philanthropy; and the question often arises whether benevolence to the individual may not be cruelty to the race. It is probably, in the present state of knowledge, insoluble.

Retrogression.

The progress of sanitary reform has not been without drawbacks, nor without at least one retrogression of a grievous character. Speaking generally, it may be said that all legislation for the improvement of health has been educational, based in the first instance upon the learning of specialists; and that experience of its effects has gradually instructed many who were at first unconvinced of its utility. No law can be useful which is far in advance of public opinion; but, when its necessity is apparent to experts, it is well that it should be in advance in some degree, so that it may exert the educational influence referred to. A law which fulfils these conditions will find a few people earnest in supporting it, and the mass of the community at first indifferent, but in time converts. Under a popular system of government it is often difficult to maintain the desired advance, because the making of laws is dependent upon professional politicians, who, by the exigencies of party strife, are frequently brought more or less under bondage to fools. My ideal of a typical fool is that he is 'wiser in his own conceit than seven men that can render a reason.' Persons of this character, who fancy themselves able to decide offhand upon profoundly difficult and intricate questions which they have never studied, and which, if they studied them ever so diligently, they would be unable to understand, constantly vex the souls of instructed sanitarians by frivolous objections to necessary measures, or by opposition to laws which are working for the public good. Sometimes their objections rest upon principles which are in themselves sound, but which have no applicability to the matter in hand; sometimes upon unfounded assertions;

sometimes upon the feeblest form of what is commonly described as 'sentiment.' By dint of persistent clamour at contested provincial elections, such persons lately prevailed upon the House of Commons to condemn legislation which, although it had been limited to certain garrison towns, had in a few years sufficed greatly to check, even among their civil populations, the spreading of contagious diseases which inflict greater evils than any others, and which mainly spring from the most profound moral degradation. In order to satisfy electioneering claptrap, this beneficent legislation was abandoned, and hundreds of a semi-criminal class, who had been placed under restraint as much for their own good as for that of the public, were compelled to return to their former existence upon the streets, and were permitted to diffuse without hindrance a malady which of all others is the most wide-spreading and the most far-reaching in its effects, which destroys thousands of lives, which passes from husband to wife, which descends from parent to child, which produces blindness, deafness, ugliness, foolishness, and everything that is hateful, and which is not always wholly extinguished even after the lapse of many generations. We are now threatened with a similar clamour against the vaccination laws; and in a balanced state of political parties there is too much reason to fear that such a clamour might be effectual. It behoves all who desire the welfare of their country to raise their voices against any relaxation of existing safeguards against disease. Our laws, as they stand, are far in the rear of what practical medicine declares to be necessary; and not only should a determined resistance be opposed to any weakening of our defences, but an effort should be made, whenever domestic legislation becomes possible, to strengthen those which we possess. For this purpose two things are mainly necessary—first, the notification to local authorities of the occurrence of any form of

contagious disease; and, secondly, the recognition of the principle that no person has any right, in the name of liberty, to inflict upon others injuries from which they are unable to protect themselves, and for which, in the nature of things, it is impossible for them to obtain redress.

Curative medicine.

Passing on now from the consideration of preventive to that of curative medicine, the progress made during the last fifty years has been such as to be unexampled in the history of the human race; and the difficulty of describing it is much enhanced by the extent to which it has followed the convergence of light, from many different quarters, upon each problem which has successively presented itself for solution. In the Middle Ages, the responsibility of treating the sick rested upon physicians, who, when they thought mechanical interference necessary, sent for a surgeon to carry out the instructions which he received. The surgeon, when he had done this, retired from the case, leaving his medical colleague in possession. As time went on, and as surgeons rose from the position of handicraftsmen, they not only took a constantly increasing share in the management of cases to which they were called, but even the entire management of many of them; and, at the time of her Majesty's accession, it would not have been difficult to define, with an approach to accuracy, the respective provinces of the two divisions of the medical profession. The

Physicians.

physician might have been described as a person whose chief occupation was to treat the maladies of internal organs

Surgeons.

by the aid of drugs; the surgeon, as a person whose chief occupation was to treat the maladies of external organs by the aid of local applications or instruments. A few diseases, such as those affecting the skin, occupied ground which was more or less debatable; but, on the whole, the line between medicine and surgery could be drawn with sufficient distinctness. Of the two forms of special practice which then existed,

the diseases of the eye had fallen into the hands of surgeons, the diseases peculiar to the female sex into those of physicians. With the progress of science and the growth of physiology, the former arbitrary divisions began to overlap each other, until to-day they are almost effaced in theory, and are only held apart in practice by customs which may almost be described as survivals. Instrumental or operative interference has been freely extended to internal organs; and the success of operations is so much governed by general conditions that no surgeon is fit for his duties unless he be also a competent physician. The diseases of the eye remain in the hands of surgeons, and the surgical resources for dealing with them have much increased in number and importance; but the resources of medicine have increased in a proportionate degree, and the ophthalmic surgeon must be thoroughly acquainted with the combinations and uses of drugs. The diseases of the female sex remain chiefly in the hands of physicians, but many of these physicians have become the boldest and most successful of operators, and may be said to practise surgery rather than medicine. New forms of specialism have arisen, some of them certainly advantageous, others doubtfully so; but each one, as a rule, dealing with the diseases of some single part, and each one requiring a combination of medical and surgical knowledge, inasmuch as any region which a specialist may favour must be liable to suffer sometimes from a disease amenable to drugs, sometimes from one which requires an operation. Surgeons no longer describe physicians as their 'unhandy brethren,' and physicians who adhere to the old traditions of their vocation constantly find it necessary to obtain the assistance of a surgeon, no longer as an operator charged to carry out the orders which he receives, but as a learned and skilful coadjutor whose judgment is held in as much esteem as his dexterity.

Their gradual fusion.

First step towards improvement of curative medicine.

The first step along the road of medical progress was in the direction of increased knowledge concerning the alterations which are produced by or which constitute disease. The time is not far distant when the physician was content to observe symptoms, with little or no acquaintance with the morbid processes or physical changes underlying them. His remedies, therefore, were mainly directed to the relief of symptoms, and he had learnt, either from his teachers or from experience, that such and such symptoms might often be relieved by such and such methods. Other symptoms he interpreted as having a fatal tendency; and, if he were a wise and observant man, he became skilful in the interpretation of variations in the state of a patient from day to day, and in the alteration of his remedies in accordance with them. He was then, in the best sense of the word, 'experienced.' His trained faculties were quick to recognise any evidence of improvement or of retrogression; and he had seen symptoms of a threatening character pass away under the employment of means which, in a case apparently of like kind, he was prepared to employ again. His 'opinion' about the prospects of recovery, or about the methods by which it might be promoted, was often extremely valuable; but it was truly described as an 'opinion'—that is to say, it was 'a persuasion of the mind, without proof or certain knowledge.'

Harvey.

It is manifestly difficult to select a starting point from which to begin the description of an advance which for many years has been continuous. Such a starting point, however, in relation to rational as distinguished from empirical medicine, may be found in Harvey's great discovery of the circulation, a discovery which paved the way to a knowledge of the uses of the heart, the lungs, the arteries, and the veins, and of the part played by the blood in the sustentation of vital force. It is worthy of note

that this discovery was a result of experiments upon living animals, and that it could have been made and verified in no other manner. The whole fabric of modern medicine, or the whole difference between the prospects of a sick man to-day and his prospects two hundred years ago, rests absolutely upon vivisection.

Avenbrugger.

It must have been known from the dawn of observation that the contents of any cavity would modify the sound which was returned when its walls were struck; and, in 1762, Avenbrugger applied this knowledge to the discovery of the nature of the contents of the cavities of the human body. He was followed by Piorry, who, in a work published in 1828, laid down definite rules for the conduct of 'percussion;' and who showed that by its means the state of the lungs, and of certain of the abdominal organs, might be investigated with some approach to exactness. In the meanwhile, Laennec, who first wrote in 1819, had discovered that the sounds produced by the actions of the heart and lungs would afford evidence of a still more trustworthy kind. He invented the stethoscope to facilitate listening, and to assist in the precise localisation of the sounds; and he ultimately left the art of auscultation, and the power of drawing conclusions from what was heard, at a point from which it has not since very materially advanced, except as regards the interpretation of the sounds of the heart. The practice of auscultation was introduced into England by Dr. Thomas Davies, assistant physician to the London Hospital, who, on account of his stethoscope, was known among the poor of the east of London, who attended the hospital as out-patients, as 'the man with the horn.' Dr. Davies' chief work on the subject appeared in 1835, and attracted much attention in the profession. It is said that Sir Charles Locock, some time physician accoucheur to her Majesty, was greatly interested in the new method of

Piorry.

Laennec.

Dr. Davies.

examination, and, at the same time, that he was not a little sceptical as to its utility. In order to resolve his doubts, he went *incognito* to Dr. Davies as a patient, and submitted his own chest to examination. The result convinced him, and he became an assiduous learner of the art.

Effects of auscultation and percussion.

By the time when her Majesty ascended the throne, auscultation and percussion were taught in all English schools of medicine, and were systematically practised at the bedside. They enabled physicians to determine the presence or absence of inflammation of the lung substance or of its investing membrane, the presence or absence of the deposits which are the immediate causes of consumption, and the daily progress of either malady. Inflammation of either the investing or the lining membrane of the heart, and alterations in its valves or orifices, could also be discovered; so that the condition of the great organs of the chest cavity, instead of being concealed, could be ascertained by a moderate exercise of skill and patience. The satisfaction of mind attendant upon the recognition and treatment of diseases of the chest speedily led to a desire to obtain similar information about those of other regions. The possession of exact knowledge in one department of the healing art, and the daily recurring experience of the value of the guidance which this exact knowledge afforded, furnished a powerful stimulus to endeavours to widen its domain.

Sir Charles Bell.

In the year 1821, Sir Charles Bell contributed to the Royal Society his demonstration of the nature of the functions of the spinal cord—namely, that its anterior columns or portions give origin to the nerves which call muscles into motion, while its posterior columns receive the nerves which minister to sensation. His researches directed the attention of other investigators to the structure and functions of the nervous system; and, in 1837, Dr. Marshall Hall discovered

the 'reflex' function of the spinal cord. This means that when an impression is conveyed along a sensitive nerve to one of the posterior columns, the resulting stimulus may be 'reflected' or turned back, through an anterior column and along a motor nerve, and may call a muscle or a group of muscles into activity, without the intervention of either volition or consciousness. At this point the inquiry was taken up by Dr. W. B. Carpenter, who devoted himself for many years to the physiology of the nervous system, but whose work, excellent as it was, led him to erroneous conclusions for want of the control which might have been afforded by experiment. Dr. Carpenter did much to popularise the study of the functions and diseases of the nervous system among the profession; but it was not until after his activity in this direction had ceased that his errors were corrected, and the deficiencies of his teaching were made good, by experiments upon living animals. The knowledge thus gained has lately been rendered sufficiently definite to admit of application for the relief or cure of disease, a part of the subject to which it will be necessary to return hereafter.

Dr. Marshall Hall.

Dr. Carpenter.

The researches of Dr. Bright, published in 1837, had shown that certain forms of kidney disease were attended by the presence of albumen in the secretion of the affected organs, and it had long been known that in diabetes sugar was removed from the system through the same channel. The attention of physicians soon began to be directed to other variations in the secretion, and to the information which these were calculated to afford. Dr. Golding Bird, by a work published in 1845, gave a great stimulus to this kind of research; and a chemical and microscopical examination of urine now forms an ordinary part of the duties of every medical practitioner. By this means much light has been thrown upon the chemistry of many vital

Dr. Bright.

Dr. Golding Bird.

processes, and information is obtained which is of the highest value in the recognition and treatment of disease.

Tempe-rature.

It was long taught by physiologists that the temperature of the blood was almost uniform, and that the manifest heat of skin by which many diseases are attended was no more than skin deep. Bärensprung and Traube, in 1850 and

Wunder-lich.

1851, showed this view to be erroneous; and Wunderlich, who commenced the use of the thermometer soon afterwards, published in 1868 an important volume on the subject. Two years previously Dr. Compton had stated his belief, founded upon more than five thousand temperature observations in hospital, that the thermometer was not calculated to be of great assistance in private practice; but the manufacture of registering instruments of sufficient delicacy at once changed the aspect of affairs, and the clinical thermometer is now an essential part of the equipment of every physician and surgeon. It constantly gives the first warning of danger, and the first sign of improvement.

Specula.

The desire for precise information as to the state of internal organs led, about 1840, to the invention of various forms of specula—contrivances for dilating natural orifices, and for rendering it possible to inspect parts which must otherwise have remained concealed from view. It is remarkable that, in this direction, human inventiveness had traversed the same ground in former ages, and that instruments resembling some of the modern specula have been found in the houses of Pompeii.

Mirrors.

The application of solar or artificial light to the exploration of the cavities of the body was first attempted by Dr. Warner and Mr. Avery, who, about 1845, constructed many ingenious instruments for this purpose, all of them resting upon combinations of mirrors, or of mirrors and prisms, by which light might be directed around corners without material diminution, and reflected back again to the eye of

the observer. The use of such instruments required not only considerable dexterity on the part of the physician or surgeon, but also much quietness on the part of the patient; and they made no great way in the profession. They were almost forgotten when, in 1855, a throat mirror, or 'laryngoscope,' which afforded a view of the vocal cords, and even of the cavity of the larynx, was invented by Señor Manuel Garcia, a professor of singing. This instrument, which was improved in 1859 by Dr. Czermak, of Pesth, was introduced into London in 1862, and revealed for inspection and treatment many previously unsuspected forms of throat disease. It enabled surgeons to see and to remove diseased growths springing from the vocal cords; and, by rendering the movements of the cords visible, it led to a better knowledge not only of their natural functions, but also of certain forms of paralysis to which they are exposed, sometimes from disease of the brain, sometimes from pressure upon their nerves by aneurysms or other swellings within the chest.

Laryngoscope.

An early effect of improvements in methods of research, and of gains in accuracy of knowledge, was the detection of real differences between many forms of illness which are somewhat alike in their obvious manifestations, and which, up to a certain period, were confounded with one another. This effect was not limited to cases in which the new methods of research were immediately applicable, but extended over a wider area, as a result of the cultivation of habits of close and careful observation. For example, Sir Thomas Watson, in 1843, declared that 'there is no line of genuine distinction between continued fevers. They run insensibly into each other, even the most dissimilar of them, and are traceable often to the same contagion.' The existence of such a line between 'typhus' and 'typhoid' had, however, been asserted in 1836 by Lombard of Geneva, and again in 1840 by Dr. A. P. Stewart; and, in 1849, an

eminent living physician completed their work, and proved the two to be different diseases, arising from different causes, pursuing different courses, and subject to different methods of propagation and transmission. The ascertainment of facts as distinguished from symptoms led also to modifications of prevailing methods of treatment, perhaps in no instance more remarkably than in the general abandonment of the once common practice of taking blood from the arm. This proceeding, which in a large number of cases affords immediate relief to difficulty of breathing or to other forms of suffering, and which was highly valued as long as the sensations of the patient were the chief guides of the physician, was discovered, when the essential nature of morbid processes was carefully studied, to afford temporary comfort at the frequent cost of permanent injury. It is thought by some that the abandonment of bleeding has been too complete; for there are probably few practitioners under fifty who have either performed or witnessed the operation. Other modifications of treatment have arisen from a more complete knowledge of the influence of drugs upon healthy and diseased action; and chemistry has kept pace with medicine by providing drugs of greater and more exact potency, as well as of less cumbrous and more agreeable form, than any which were available even twenty years ago. The introduction of the needle syringe, for administering medicines by injection under the skin, may be also noted as having marked a distinct advance in the means by which curative agencies can be brought into operation.

Surgery. The discovery of anæsthetics.

While the science of medicine, distinctively so called, was thus advancing towards the attainment of more exact knowledge, the science of surgery was revolutionised by a single great discovery. Sir Humphry Davy, the discoverer of 'laughing gas'—or, as it is technically called, 'nitrous

oxide'—occasionally inhaled this substance for the relief of pain, and suggested, in a memorandum which was published in 1839, that its uses in this direction might be extended. The suggestion seems to have been scarcely noticed until, in 1844, some not very successful experiments with the gas were made by Mr. Horace Wells, a dentist of Connecticut. But, towards the latter end of 1846, another American dentist, Mr. Morton, succeeded in producing insensibility to pain by the inhalation of ether, and he extracted a tooth without the knowledge of the patient. On the 16th of October in the same year, Dr. Warren, of Boston, U.S., made an incision some inches in length upon an etherised patient, whose consciousness of pain, although much lessened, was not destroyed; and, on the following day, Dr. Hayward, of the same city, removed a tumour from the arm of a woman without giving her pain. An amputation above the knee, and the removal of a portion of the lower jaw, were performed under similar conditions; and, on the 17th of December, a report of these cases, and of the manner of administering the ether, reached this country. On the 19th, the late Mr. Liston operated painlessly upon two etherised patients; and, in a few days, intelligence of the new discovery was almost universally diffused.

Ether.

The reception accorded to ether varied with the temperaments of different persons. In April 1847 Sir John Forbes spoke of the discovery as a 'matchless and priceless one,' which might, nevertheless, be attended by compensating evils; while many surgeons were outspoken in their condemnation of it, and could with difficulty be prevailed upon to use it in their operations. Many predicted that it would be only a nine days' wonder, soon to be abandoned; and cases in which evil results were said to have followed its employment were brought before medical societies and put in circulation. But patients requiring operation were

Its reception in England.

determined to avail themselves of insensibility, and even the most reluctant practitioners were compelled to swim with the stream. Before the end of 1847, *Punch* contained a notice of 'an old-fashioned surgeon,' who described operations under ether as 'senseless operations.'

The ether which was then attainable was often impure or imperfectly prepared, and its use was attended by many disadvantages; while there was much to learn with regard to the best methods of administration to different patients. Before the middle of 1847, Sir James Simpson had given it to women in childbirth, and his experience of its effects induced him to try experiments, upon himself and others, with other chemical preparations of a somewhat analogous character. From among these he finally selected chloroform as the best and most convenient, and for many years it was employed almost universally, although bichloride of methylene and a few other agents acquired now and then some temporary reputation.

Chloroform.

When the operations performed under chloroform could be numbered by thousands, it became manifest that the anæsthetic itself was in some cases a source of danger, chiefly by paralysing the action of the heart; and enough deaths were recorded to show that the mortality attributable to the inhalation might be placed at perhaps one death among three or four thousand cases. In some places, and in the hands of some administrators, this proportion was exceeded, and the fact that chloroform was not a perfectly safe agent became known by degrees both to the public and the profession. On the other side of the Atlantic, where some fatal cases had occurred, a feeling arose that ether was safer than chloroform, and the former was largely restored to favour. The necessary skill in its administration and regulation had been gained, it could be obtained pure in any quantity, and it was said that no deaths were distinctly

Its dangers.

traceable to its influence. In some American hospitals the abandonment of chloroform was even enjoined by rule, and in England ether superseded it to a great extent. Partial return to ether.

In the meanwhile, the use of nitrous oxide gas had been reintroduced as a ready means of producing insensibility to pain for short periods, especially for dental operations; and it was found that gas and ether might be advantageously combined in general surgery—the gas to produce insensibility, the ether to maintain it when produced. For some purposes, and for some persons, chloroform is still the best anæsthetic, although gas and ether are somewhat more safe, and are applicable to the majority of patients and of operations. The question what anæsthetic to employ is one which should be decided by the surgeon in every case. It is sufficient for the public to know that declared weakness, or even structural disease, of the heart is no barrier to the use of chloroform; that the cases in which its action upon that organ has proved fatal have usually been those of persons in apparent health, requiring some trifling operation; and that, generally speaking, few people take it better than those who fancy that something in their condition is prohibitory of its use. The mortality which it occasions is so small as to place no difficulty in the way of its employment, whenever this is desirable on other grounds. Nitrous oxide. Relative advantages.

The use of anæsthetics has changed the whole aspect of surgery. Prior to 1847 operations were few in number, and were almost limited to the amputation of limbs, the removal of cancerous and other tumours, the resection of a few of the larger joints, cutting for stone, and the ligature of main arteries for aneurysm. The pain suffered by the patients was so horrible as to tax severely the endurance of the bravest and strongest, and to depress seriously, and often beyond recall, the powers of life. Death from 'shock' was by no means uncommon, the patient sink- Effect of anæsthetics. In preventing pain.

ing in a few hours from the effects of the suffering which he had undergone. The writer well remembers, as a medical student, turning sick and faint at the agonies which he was called upon to witness; and it was a point of honour with operators in those days to abbreviate such agonies as much as possible, and to cultivate speed in operating as the highest and the most valuable form of dexterity. Nothing was attempted which could not be done quickly, and an amputation in the hands of a practised surgeon had almost the appearance of a feat of legerdemain. For the separation of the lower limb above the knee, of course not including dressing, twenty seconds has been known to suffice; and forty seconds was regarded as a period of time which no one was justified in exceeding.

In preventing haste.

When anæsthetics were employed, it came to surgeons as a kind of revelation that they need no longer be in haste; and they utilised this knowledge in making a leisurely examination of the parts about which they were employed. The progress in this direction was gradual. Tumours were removed slowly and carefully, and hence more completely and effectually than before; and amputation, which had been almost the sole resource in many of the incurable affections of joints, began to be superseded by the removal of the parts actually diseased. Such gradual changes of method were generalised by Sir William Fergusson under the name of 'conservative surgery,' and it became an accepted principle that nothing should be taken away which it was possible to leave with safety. Hence, in a large proportion of cases, the surgeon was enabled to cut out the diseased part—the hip-joint, the knee-joint, or the ankle, the shoulder or the elbow—and to leave a member which might regain considerable strength and usefulness.

'Conservative' surgery.

Difficulties from bleeding.

Among the difficulties which impeded the performance of operations of this 'conservative' character, one of the

most troublesome arose from the effusion of blood during their course, by which the appearance of the parts was obscured, leaving the precise boundaries of disease to be ascertained by touch, with only imperfect assistance from the sight; so that, in using the knife in the vicinity of important structures, it was difficult to avoid wounding them. This difficulty was overcome by pressing the blood out of the affected limb by an elastic bandage commencing at the extremity and firmly applied. When this bandage has been carried high enough, it is unwound from the extremity upwards sufficiently far to expose the diseased part to the surgeon, but is retained higher up until the operation is completed and the divided vessels are secured. The parts on which the operation is performed are for the time rendered bloodless, and every organ and tissue is clearly seen as it is laid bare. The same method has been employed to save blood in the performance of amputations upon feeble persons. The blood contained in the part to be removed is first squeezed out of it, and the only hæmorrhage will be the oozing that may occur, when the bandage is relaxed, from vessels which are too small to require individual ligature.

Subjects for operation.

Prior to the use of anæsthetics, the subjects of operations were carefully selected, and were chiefly persons of sound constitution and strong will, whose conditions, apart from the cause of the operation, were favourable to recovery. But, notwithstanding, almost every operation was followed by what was called 'surgical fever,' and, even in the most successful cases, the surgeon never expected his patient to be quite well, except for the presence of a wound, during the whole of the healing process. There would almost always be some quickening of the pulse towards evening, some thirst, some restlessness, and, as was first discovered when attention was paid to the indications of the thermometer, some increase of the heat of the body, often

Surgical fever.

preceded by chills and followed by perspiration. In cases which pursued a less favourable course, the surgical fever ran high. In some instances it assumed a malignant type, and the patients sank under it; in others it was followed by the formation of abscesses in various parts, and was then described as pyæmia, which also usually led to a fatal termination. It was rare indeed for extensive wounds to heal by what is called 'primary union'—that is to say, by direct agglutination without the formation of discharge—and discharge, whenever formed, speedily became offensive. The removal of the dressings from an amputation or other large surgical injury was attended by an escape of fœtid liquid, formed at first by the decomposition of blood which had oozed from the surfaces of the wound, and ultimately by secretion from these surfaces under the name of matter. In some cases and situations, chiefly where the wounded were crowded together, as in military hospitals after a battle, or in civil hospitals in which sanitary precautions were neglected, the discharge was apt to become more profuse and more fœtid than usual; the wounds frequently assumed an unhealthy aspect, and these conditions led on to erysipelas, gangrene, and death. After anæsthetics were employed, there being no longer any fear of pain to stand in the way of consent, it became a recognised principle to give to each patient every possible chance; and, partly also on account of the less formidable character of the resulting mutilations, operations increased enormously in number. For some years the success which attended them did not increase in an equal ratio, and surgical mortality became very large. The causes of this mortality were chiefly the conditions associated with the more severe forms of surgical fever; and these were described collectively as 'hospitalism,' because, although they were met with also in private practice—that

is, when there was only a single patient in a house—they were certainly more frequent in hospitals, or wherever the operation cases were numerous. The chief forms of 'hospitalism' were 'hospital gangrene,' 'pyæmia,' 'septicæmia,' and 'erysipelas,' all regarded as results of 'blood-poisoning.' The blood and other fluids of the animal body, and generally all the solids and liquids which are called, from their chief constituent, 'albuminous,' are prone to speedy putrefaction as soon as they cease to be integral parts of a living structure. Their decomposition requires the presence of atmospheric air, and is promoted by a high temperature, or by the presence of material in which decomposition has commenced. In a wound, the albuminous liquid yielded by oozing is kept at the temperature of the body, and the decomposition of this liquid would constantly begin before the time for the first dressing had arrived. In a hospital ward, when the wound is opened, it is brought into contact with air, which may itself be a carrier of the products of decomposition from other wounds, or of albuminous material of some other kind in a state of commencing change, not to mention the infinite possibilities of inoculation from sponges or other appliances, or from the fingers of dressers or nurses. It has been found, as the result of experiments, that the inoculation of decomposition, if it may be so described, produces a more active poison than any decomposition which is spontaneous, and also that the increase of virulence thus produced is steadily progressive. An animal poison may be cultivated, so to speak, in successive patients, until it becomes as deadly as that of the rattlesnake. On these grounds it was assumed that the aggregation of many wounded persons produced an atmosphere unfavourable to all of them—that the patients, in effect, poisoned not only each other, but the very rooms in which they lived; and it was gravely

Septic inoculation.

proposed that the hospitals of the future should be cheap temporary buildings, which might be destroyed by fire as soon as they were saturated with contagion from the inmates. When excessive surgical mortality began to attract attention, it became manifest that certain wards in some hospitals, and even the occupants of certain beds, were more exposed to danger than others; and, in the case of one metropolitan institution, that the occupant of a particular bed was doomed to almost certain death. This bed, as it turned out, was close to a window which overlooked a dirty dust-heap, the particles from which found easy access to the ward.

Drainage of wounds.

A suggestion once put forward with some appearance of authority, to the effect that hospital mortality increased directly as the size of the building and the number of patients which it received, was speedily shown to be founded upon the examination of an insufficient number of instances; and, for a long time, little more was known about the causes of the various putrefactive diseases than the fact that they seldom occurred after wounds to which no air was admitted, or when, by carefully contrived drainage, all fluids were removed as fast as they were secreted. The former condition was fulfilled in the so-called 'subcutaneous' surgery; that is, when deep parts were divided by a narrow knife introduced through a very small skin opening—a mere puncture—the proceeding being so conducted as to exclude air both during the performance of the operation and subsequently. The wounds made in this manner heal, and the divided structures unite, with great readiness; but the method is of limited applicability, and its use is almost confined to the division of tendons for the cure of deformities. The method by drainage was based upon the observed fact that wounds which had an opening at their lowest point, by which all discharges escaped as soon as formed, were more

favourably situated for recovery than those in which discharges could collect. A depending opening was hence regarded as a thing to be secured whenever possible, and has been secured of late years, in almost all cases, by the insertion of tubes with perforated sides, which afford a quick and easy outlet for fluids. Such tubes are sometimes made of india-rubber, and require to be removed when they have done their work, sometimes of materials which themselves undergo solution and absorption in the wound.

'Antiseptic' surgery.

The removal of the disgrace of excessive mortality from surgery was commenced in March 1865, when an eminent living surgeon introduced the 'antiseptic' method into the Glasgow Infirmary, from whence, in principle or in detail, it has spread over the civilised world. The attention of the originator of this method had been directed to Pasteur's researches on milk fermentation; and he came to the conclusion that putrefactive changes in wounds might be due to the introduction of bacterial germs, and that, if these germs could be excluded, uninterrupted healing might be expected to occur. In order to effect his object, he introduced the plan of operating under a cloud of spray, charged with some chemical agent which was supposed to be a 'germicide;' the hands of the operator and his assistants, together with all instruments, sponges, and appliances, being also cleansed by chemical means, and kept moist with the solution employed for the purpose. When the operation was completed, and the wound was closed, the spray was not withdrawn until a chemically prepared and impermeable dressing had been applied. By this course, surgical fever was often entirely avoided; and when the time came for the dressing to be removed, which was not done until after the lapse of a longer period than had formerly been customary, both the removal and the renewal were accomplished under spray; and it was constantly found that the wound

was free from offence, and that very little discharge had proceeded from it. In this way, the prompt and perfect union, which even in former times had occurred occasionally, was obtained in the great majority of operations, as well as in wounds which were the effects of accidental injury. The system thus described was called the 'antiseptic' or the 'aseptic;' and it was taken for granted by many that the germ hypothesis was a sound one, and that the introduction of germs which were suspended in the atmosphere, otherwise likely to happen as an ordinary event, could by the indicated measures be securely guarded against.

Carbolic spray.

The chemical agent most commonly employed in spray was carbolic acid, concerning which there was from the first much doubt whether its effects on bacterial germs would really be destructive, unless it were present in such quantities as to render the air containing it irrespirable by human lungs. In some cases, indeed, it actually was applied with such liberality as to injure, or even to kill, the patient by carbolic acid poisoning. Alarmed by such occurrences, some surgeons diminished the proportion of acid which the spray contained, and then, finding that their cases did as well as before, omitted the acid altogether, using only a spray of water, and finally abandoned this, the employment of which, while it presumably was not important, was attended by many inconveniences. As a rule, those who pursued this course retained the chemical purification of instruments and the elaborate cleanliness which antiseptic surgery had introduced. It was soon found that the success gained under these conditions did not fall short of that which followed strict adherence to the original system; and many surgeons have now laid aside antiseptics altogether, and are obtaining results which others who use antiseptics have not on the whole surpassed. In certain foreign countries, where antiseptic surgery has been

Water spray.

pursued with extreme fervour, and has been carried to lengths which provoke a smile, no greater success has been obtained than in England by less rigorous measures. In some continental hospitals, surgeons who, a few years ago, would have thought the ordinary personal cleanliness of an Englishman extravagant, and who were probably unacquainted with the nature and uses of a nail-brush, now not only wash themselves before operating after the manner of the actor who blackened himself all over in order to play Othello, but they enforce similar observances upon their assistants, and drench with carbolised spray even the hapless spectators, whose clothes, it is said, may carry unsuspected stores of germs in the textures of which they are composed.

Germ hypothesis.

The germ hypothesis has in this country adherents whose opinions are entitled to respect, but it appears to me to be not proven, and more likely to be abandoned than to be confirmed. If atmospheric air is loaded with 'germs' in the way sometimes described, it is difficult to explain the prompt healing of wounds which was not unknown, even in town hospitals, before antisepticism had been thought of. In certain injuries, notably in fractures of a rib with wound of a lung, it is not uncommon for the air inhaled by the patient to pass into and distend the connective tissue of his body; but I have never heard of any instance in which such an accident occasioned any of the phenomena of septicæmia. I am myself inclined to look upon these phenomena as being chiefly due to absorption of, or to inoculation with, animal matter in a state of decomposition or change and to attribute the improved results of antiseptic surgery almost entirely to the prevention of such inoculation, a prevention brought about by the absolute and chemically completed cleanliness of the hands and instruments employed. The results in question have, in most cases,

surpassed those previously attained in precise proportion to the prior uncleanness of the hospital into which the system was introduced; and the evidence now attainable does not seem to me to sustain the germ hypothesis, but to enforce the necessity of so conducting an operation that no decomposing matter can be conveyed into the wound, either by human hands or by any of the instruments or materials employed. The shoulder of a knife, the eye of a needle, the fibre of a ligature, the finger-nails of the surgeon or of an assistant, are all places in which such decomposing matter may obtain a resting-place, and from which it may find entrance into a wound; and I am myself indifferent about the admission of air, so long as I am certain of the freedom of the instruments and other accessories from decomposing matter. Such freedom may be insured by a final cleansing in various chemicals, of which none is better than absolute alcohol. It should be stated that decomposing albuminous matter generally swarms with bacteria, probably of many varieties, and it may be that these are the chief causes of the commencement of putrefactive change.

Ligatures.

A source of irritation after the operations of an earlier period was the method once followed of closing divided arteries by stout silk ligatures, the ends of which were left protruding from the wound. These ligatures cut through the internal coats of the vessels on which they were placed, and eventually cut through the external coats also, and became detached. They seriously retarded the healing process, which could not be completed until they were withdrawn; and their separation was sometimes attended by dangerous or fatal bleeding. Even under the antiseptic method, a wound cannot unite as long as it contains silk threads; and hence the adoption of this method called for better ways of securing arteries than those which had previously been in use. Twisting the divided vessel, com-

pressing it by the introduction of a needle, which could be withdrawn as soon as its purpose had been fulfilled, and other plans, were tried with more or less advantage; but that which has now superseded all others is the use of ligatures composed of some animal material, which undergoes absorption within the body. The arteries are tied, the surfaces of the wound are brought into perfect apposition, healing occurs, and the ligatures disappear without producing irritation and without leaving a trace behind.

Extension of the domain of surgery.

Under the use of soluble ligatures, perfect drainage, accurate coaptation, and absolute cleanliness, either with or without the spray and other special 'antiseptic precautions,' the mortality from surgical operations has been diminished in an extraordinary degree, and the success attending them has in like measure been increased. The great cavities of the body are freely explored; organs which until lately it would have been thought dangerous to touch are now examined, and, if found diseased, are removed. The kidneys, the liver, the spleen, and the greater part of the intestinal canal have been brought within the domain of surgery; and two specially remarkable victories over disease have been won, the fruits of the first of which have already been rendered completely accessible to the public, while those of the other and more recent one are likely soon to become so.

Ovarian tumours.

Women are subject to a form of internal tumour called 'ovarian,' which, if left to itself, is always fatal. It usually occurs in middle age, and the average duration of life, after it is discovered, is four years, much of which time would be spent in suffering and weakness, and in the anticipation of the inevitable end. The almost accidental removal of an ovarian tumour was accomplished by Dr. Houston, of Glasgow, in 1701; but the suggestion that such operations should be frequently undertaken appears to have been first made by John Bell, the great Edinburgh teacher

of the close of the last century. The operation was first performed, as a direct result of Bell's teaching, in 1809, by Dr. Ephraim McDowell, of Kentucky, who had attended Bell's lectures, and who took the first opportunity of carrying his suggestion into practice. Lizars, in 1825, was the first to perform the operation in this country, and Dr. Granville, in 1827, was the first in London. The first successful operation in London was performed by Mr. Walne, in November 1842; and the first successful operation in a London hospital by Mr. Cæsar Hawkins, at St. George's, in 1846. During the next eleven years the operation was frequently repeated, especially in Manchester; but the resulting mortality was so great that the proceeding was scarcely thought to be legitimate. The disease was, indeed, invariably fatal, but it was of uncertain duration; while the deaths which followed the operation were its immediate, direct, and visible results. The mortality exceeded 50 per cent. of the cases, and surgeons might well hesitate to recommend so great a risk to their patients. A woman who was not certain to die in less than ten or a dozen years, even although she might die sooner, could hardly be recommended, for the sake of a doubtful prospect of cure, to submit to a proceeding which was attended by so much danger. Partly, perhaps, for this very reason, the cases operated upon were mostly those in which a fatal result of the disease itself was clearly imminent, in which the constitution was already broken, and in which, therefore, the hope of a favourable issue was proportionately small. It can hardly be a matter for surprise that Sir William Lawrence, in concluding a debate upon the subject at the Royal Medical and Chirurgical Society of London in 1850, asked whether the operative attempts already made could be continued 'without danger to the character of the profession.'

In 1857, when the question was much where Sir William Lawrence had left it, the removal of ovarian tumours was taken up by an eminent living surgeon, who set himself to ascertain what were the chief risks of the operation, and by what means they might be overcome. Constantly watching for the tendency to death, and as constantly trying to obviate this tendency by observing and counteracting its causes, he improved the methods of procedure alike in principles and in details, and for many years obtained a steadily decreasing rate of mortality. Since 1857 he has operated 1,171 times. Of the first 1,000 patients, 768 recovered and 232 died, showing a mortality of 23·2 per cent. Of the last 171 cases 22 have died, showing a mortality of 12 per cent. During the last nine years, from January 1878, he has operated with more or less adherence to antiseptic methods; but, as if to show that the diminution of mortality has been due to other causes, his previously unapproached success has been surpassed by that of a provincial surgeon who does not use antiseptics, and who, between June 1884 and the end of January 1887, has removed 251 ovarian tumours with only two deaths. The same surgeon has had a total of 590 cases, with 16 deaths among the first 62, and, after a modification of procedure, with 19 deaths among the last 528. It was calculated by Lord Selborne that the successful removal of an ovarian tumour might be expected to add twenty-nine years to the life of the patient; and, on that basis, the two operators referred to have added those years to the lives of 1,472 women, or a total of 42,688 years in all. The example thus set has been followed in every civilised country, as well as by many other operators in our own; and the disease, once so deadly, is now regarded as one for which, indeed, an operation is required, but which the operation only exceptionally fails to cure. It is, of course, more frequently suc-

cessful in some places and in some hands than in others; but the percentage of death which follows it is now extremely insignificant. There is no other application of human skill and knowledge which has been attended by so brilliant a result.

Brain surgery.

Next to this in order, but far more recent in time, is modern brain surgery. I have mentioned in an earlier page that the labours of those who first sought to discover the functions of different parts of the brain were rendered futile by the want of experiments on living animals; and, as soon as such experiments were conceived with sufficient knowledge and conducted with sufficient skill, they revealed much which was previously not only unknown, but even unsuspected. Dr. Carpenter arrived at the conclusion that the hemispheres of the brain were the seats of ideation; but experiments have shown that they contain the originating centres of many kinds of movement, and that different portions of them call forth the movements of different groups of muscles. By researches of this kind, it was discovered that irritation or disease of the motor area governing a particular limb may occasion convulsions commencing in that limb; and it was but a step farther to determine that convulsions commencing in different parts of the body might indicate disease of corresponding parts of the brain. By following out the clue which was thus afforded, it has been rendered possible to point to the spot in which the brain, in certain cases, is irritated or diseased, and the skull can then be opened and the part explored. The first operation of this kind was performed in 1885, and a tumour was found and removed. The patient lived long enough to show that he had derived great benefit, but died soon afterwards of some casual illness. Since then, twelve operations of a similar character, with only one death, have been performed at the National Hospital for the Paralysed and Epileptic in

Queen Square, and a few less successfully at other places, all the operators having been guided by symptoms to the correct localisation of brain disease. In several of the cases, tumours have been removed, one of them weighing over four ounces, and some of the patients have been cured of most distressing maladies. The method is still in its infancy, and it is probable that many brain tumours will always be inaccessible to the surgeon; but there can be no doubt that the power of useful interference will be constantly increased, and that much which would now be thought impossible will in time be habitually accomplished. Quite lately, at the same hospital, it has been shown that the space between the brain and its investing membranes can be drained, and the brain to some extent relieved from fluid pressure, by an opening in the sheath of the optic nerve behind the eye; and this operation, which as yet has been performed once only, will, there is reason to hope, have a field of future usefulness.

Ophthalmic medicine and surgery.

Among special departments of the healing art, the first place must be given to that which deals with the diseases of the eye, and which includes optics, as well as medicine and surgery. The construction of the eye conceals its deeper parts from view; and, in relation to these, nothing was gained from the various contrivances of Mr. Avery. But, in 1847, Mr. Charles Babbage invented an instrument by which the interior of the eye was rendered visible. Unfortunately, he took his invention to a surgeon who failed to appreciate its value, and who said it would be of no practical utility; on which Babbage laid it aside as a useless toy. Four years later, Professor Helmholtz arrived at a somewhat different solution of the same problem, and sent his contrivance to Albrecht von Graefe, who at once set to work to utilise its revelations. The instrument of Helmholtz scarcely afforded sufficient illumination, and

Professor Ruete improved upon it by a reproduction of that of Babbage, which was thus re-invented in Germany, and which speedily underwent various trifling modifications.

The ophthalmoscope.

The new instrument was called an 'ophthalmoscope,' and it brought, for the first time, living nerves and their blood-vessels into view. The nerves were directly continuous with the substance of the brain, the blood-vessels with those of its circulation; and hence the ophthalmoscope soon began to render important service in the investigation of diseases of the brain, and also, strange as it may seem, in those of the kidneys. Besides this, it displayed many previously unsuspected conditions in the eye; and thus, not only by what it revealed, but almost as much by the impulse which it gave to accurate examination, it revolutionised ophthalmic medicine and surgery. The diseases and disorders of the deeper parts of the eye, at the time immediately prior to the invention of the ophthalmoscope, were less known and less understood than any others; and it would not now be too much to say that they are better understood than any others. The changes which attend them can be seen, under brilliant illumination and considerable enlargement, in every stage of their progress; and they have been studied, for the last five-and-thirty years, with the most unremitting diligence and care. Among the principal results which have been attained, the following are especially noteworthy:

Results.

A common disease called 'glaucoma,' which formerly always proceeded to complete and hopeless blindness, has been discovered to depend upon over-distension of the eyeball by its contained fluid, and to be, in the great majority of instances, curable by a timely operation.

Many cases in which there is incapacity to use the sight for more than a short time, and which produce inability to follow various callings, have been shown to depend upon

faults of shape of the eyeballs, and to admit of relief by properly adapted spectacles.

The condition called 'myopia,' or 'short sight,' has been shown to depend upon elongation of the eyeballs; and the chief causes of this elongation, the tendency of badly lighted and badly fitted schoolrooms to produce it, and the modes of prevention, have been clearly established.

Partly from the advantage afforded by a passive eye, which was obtained by the administration of ether or chloroform, and partly from methods of procedure suggested by better knowledge of the organ, the success of the operation for the removal of senile cataract, which probably did not reach 50 per cent. of the cases fifty years ago, has now been raised to about 95 per cent. The usefulness of the restored vision has also been increased by improvements in the necessary spectacles. The last winter exhibition of the Society of British Artists, at the Suffolk Street Gallery, contained two paintings which were produced after recovery from a cataract operation.

The operation for the cure of squint, which was first performed by Dieffenbach in 1839, and by Mr. Bennett Lucas in 1840, in neither case with any comprehension of the true nature of the condition to be remedied, has been placed upon a basis of certain knowledge and rendered uniformly successful.

Cocaine

Towards the close of 1884, the resources of ophthalmic surgeons were increased by the discovery of the properties of cocaine, which possesses the power of temporarily destroying the sensibility to pain of the part to which it is applied. This power is better displayed in the eye than elsewhere, on account of the rapid absorption which occurs through its delicate skin; and by its means any operation upon the eye, whether for glaucoma, cataract, squint, or of whatever kind, may be rendered as painless as cutting the

finger-nails, without interference with consciousness and without the production of any constitutional effect. The use of ether or chloroform, although it greatly facilitated ophthalmic surgery, and was in a high degree conducive to its improvement, was attended by serious disadvantages; while that of cocaine, which affords the same benefits, seems to be free from any kind of objection. The highest value of the drug is in rendering operations painless, but it has also a wide range of usefulness in the treatment of many affections of the eye for which no operation is required.

Diseases of women. Child-birth.

The diseases peculiar to women, other than ovarian tumours, have derived their full share of benefit from the progress of the half-century; and great practical advance has been made in the management of difficult childbirth. The lives of mother and child are now constantly saved in circumstances in which, fifty years ago, one or both would have been sacrificed; and in this country much has been done to diminish the proportion of difficult cases. The health-preserving legislation already described, and the character of the food consumed by the English labouring classes as compared with those of continental countries, have largely contributed to extinguish rickets and other diseases of the skeleton, which are frequent causes of distortions on which the most serious forms of impeded childbirth depend. The introduction into the lying-in room of the principles of antiseptic surgery in their true character, as cleanliness carried to perfection, has saved the lives of many mothers and the eyesight of many children, and has reduced the mortality in lying-in hospitals, which were once periodically visited by deadly pestilence, to that which obtains among the general population.

Other specialisms.

Of other special branches of practice, considerations of space forbid me to speak at length. Aural and dental

surgery have been greatly improved, and both are likely to retain their separate characters. Of the rest, it seems to me that many are calculated to serve some temporary purpose, to promote the study of a disease on which new light has been thrown, or the employment of a new method of research; and that, when either of these purposes has been fulfilled, the special branch may with advantage be absorbed into the stream of ordinary professional work. The use of the stethoscope was a specialism fifty years ago; it now forms part of the daily duty of every practitioner.

Skilled nurses.

The application of improved medical and surgical knowledge in the sick-room has been greatly facilitated by the education and training of professional nurses: a work which was commenced by Miss Nightingale as one consequence of the lessons taught by the Crimean war. These nurses now form a numerous and invaluable body of public servants, discharging their important and arduous duties with an amount of care and self-devotion of which it would be difficult to speak too highly.

Part played by England.

The reader who has followed me thus far will hardly have failed to notice that the part played by England and her people in the advancement of medical science has been greater, not only than that of any other country, but than that of all other countries put together. In the way of preventive medicine we stand absolutely alone; a few continental researches being just of sufficient value and importance to illustrate the height of our pre-eminence. In the way of curative medicine, the modern temple of Æsculapius may be said to rest upon three discoveries which have constituted epochs—upon the discovery of the circulation, the discovery of the functions of the spinal cord, and the discovery of reflex action—and all of these are English. The application of cleanliness to surgery is English. The employment of anæsthetics is American. France may claim

auscultation and the stethoscope; Germany, by an unhappy accident, the ophthalmoscope. In all countries there have been felicitous applications of knowledge, suggestions which have lightened the difficulties of surgery, and between which it would be impossible to institute comparisons; but it may be questioned whether the whole of them are not outweighed, in value to the human race, in the relief of suffering and in the preservation of life, by the one English achievement of the successful removal of ovarian tumours.

Restricted aids to investigation.

It will be felt, moreover, by all who are acquainted with the facts in this regard, that there is no other civilised country in which the labours of those who have made medicine what it is have been so slenderly encouraged by any form of public help or recognition. Many continental cities support laboratories and professorships, which afford leisure and opportunity for forms of scientific research of the highest value, which are not, in any direct sense, remunerative to those who are engaged in them, and which in England can only be pursued, under impediments from silly legislation, amid the anxieties of early struggles for subsistence, amid the cares and fatigues of practice, or with the diminished physical and mental energy incidental to the decline of life. The scanty and inadequate rewards or honours which have been bestowed upon physicians and surgeons have seldom fallen to those who were in the van of scientific progress; unless, by a coincidence which fortunately has not been too uncommon, they were also the personal advisers of the great. The master of sanitary science, the organiser and for years the official head of a system of public health preservation which is without equal in the world, the philosopher whose teaching has saved the lives of hundreds of thousands of our people, whose name is a household word wherever preventive medicine is studied, and whose writings form the classical literature of the

subject to which much of his life has been devoted, this man has been suffered to retire from the public service of his country with the pension of a meritorious clerk, and with no other privilege or distinction than that of being styled a Companion of the Bath!

General practitioners.

It would be unjust, after glancing at the labours by which medical science has been increased, not to say something about the persons by whom the fruits of those labours have been diffused. In the reign of Queen Victoria women have for the first time been permitted to hold a place among the ranks of authorised medical practitioners. The first to acquire this privilege was Miss Blackwell, who graduated in America prior to the passing of the English Medical Act of 1858, and who, having been in this country, was permitted to register. The first English lady doctor was Miss Garrett, since better known as Mrs. Garrett-Anderson, who commenced her studies in 1861, obtained the licence of the London Society of Apothecaries in 1865, and the M.D. degree of the University of Paris in 1870. More recently, a special medical school for women has been established in connection with the Royal Free Hospital, and fifty-five women, of whom two have died, have obtained qualifications. Of the survivors, eleven are in India, one is in China, and one in Africa. There are at present sixty-one students at the school; twenty-three of whom are preparing for the University of London, five for the King and Queen's University of Ireland, and the rest for the Scotch or Irish Colleges. The demand for the services of medical women in this country has probably been less than was expected; but in India a wide field of usefulness is open to them. With regard to men, the lapse of fifty years has witnessed an enormous improvement in all that relates to preparation for their duties. At the beginning of the century, the education of the representatives of the now

numerous and important class called 'general practitioners' was lamentably defective. In 1815, after the Royal College of Physicians had declined the task, the Society of Apothecaries undertook to superintend a reform, and to provide an examination in medicine which the law might recognise as affording a valid qualification to practise. The standard of this examination has been judiciously raised from time to time; and the Society, by the operation of the Medical Act of 1886, will be entitled, after July 1, 1887, to confer a valid qualification in surgery as well as in medicine. In 1861 the College of Physicians instituted a medical examination for general practitioners; but the licence thus given is as yet held by only a comparatively small number of persons, and it is mainly as a consequence of the action of the Society of Apothecaries, coupled with that of the Royal College of Surgeons, that the Queen's Jubilee will find, in every part of her Majesty's wide empire, medical men who are fully prepared to undertake any responsibility which can legitimately be imposed upon them, who have been trained in the best traditions and in the widest knowledge of their calling, whose tenderness and humanity have become proverbial, and who, content with the modest pittance which is frequently all they can obtain, shrink from no hardships, no fatigues, and no dangers which the perils of others may require them to encounter.

The Society of Apothecaries.

ROBERT BRUDENELL CARTER.

LITERATURE.

THE age of Queen Victoria is as justly entitled to give name to a literary epoch as any of those periods on which this distinction has been conferred by posterity. A new tone of thought and a new colour of style are discernible from about the date of the Queen's accession, and, even should these characteristics continue for generations without apparent break, it will be remembered that the Elizabethan age did not terminate with Elizabeth. In one important respect, however, it differs from most of those epochs which derive their appellation from a sovereign. The names of Augustus, Lorenzo, Louis XIV., Anne, are associated with a literary advance, a claim to have bequeathed models for imitation to succeeding ages. This claim is not preferred on behalf of the age of Victoria. It represents the fusion of two currents which had alternately prevailed in successive periods. Delight and Utility met, Truth and Imagination kissed each other. Practical reform awoke the enthusiasm of genius, and genius put poetry to new use, or made a new path for itself in prose. The result has been much gain, some loss, and an originality of aspect which would alone render our Queen's reign intellectually memorable.

Looking back to the eighteenth century in England, we see the spirit of utility entirely in the ascendant. Intellectual power is as great as ever, immortal books are written as of old, but there is a general incapacity not only for the-

production, but for the comprehension of works of the imagination. Minds as robust as Johnson's, as acute as Hume's, display neither strength nor intelligence in their criticism of the Elizabethan writers, and their professed regard for even the masterpieces of antiquity is evidently in the main conventional. Conversely, when the spell is broken and the capacity for imaginative composition returns, the half-century immediately preceding her Majesty's accession does not, outside the domain of the ideal, produce a single work of the first class. Hallam, the elder Mill, and others compose, indeed, books of great value, but not great books. In poetry and romantic fiction, on the other hand, the genius of that age reaches a height unattained since Milton, and probably not destined to be rivalled for many generations. In the age of Victoria we witness the fusion of its predecessors. The ends of the eighteenth century were sought by the methods of the early part of the nineteenth; but whereas the spirit of reconstruction had then been only represented by a solitary Coleridge or Shelley, and by one prophet of a new dispensation, Bentham, nearly every writer of mark was now to be pressed into the cause.

To fix the precise beginning of a literary era is a difficult problem. Works instinct with the deepest spirit of the Victorian age had been published under William the Fourth. But, apart from the obvious convenience of dating the era named after our Queen from the beginning of her reign, the first positive indication of the new aspect in which familiar things were beginning to appear exactly concurred with her accession. Queen Victoria had reigned eleven days when, on July 1, 1837, the *Westminster Review* came forth with an essay by John Stuart Mill—the foremost representative of the utilitarian element in the spirit of the age—on Carlyle's 'History of the French Revo-

lution,' the most concentrated expression of its poetry and imagination. It began, 'This is not so much a history as an epic poem, and notwithstanding, or even in consequence of this, the truest of histories.' These memorable words proclaimed the essential identity of truth of fact and truth of imagination, and also the alliance which had come to pass between men of fact or reason and men of poetic sensibility. This was to be the note of the time. We shall find the measure of the influence of poetry and fiction to be that of their applicability to the problems of human existence; on the other hand, the votaries of science will be found resorting to bold imaginative generalisations, while historians are equally intent on amassing facts and on giving them life. Hence the literature of the age was destined to be ardent, animated, emphatic; its faults were to be found in the direction of over-picturesqueness, and failure in mental sanity and steady balance. Deriving its stimulus from wants universally experienced, it was to be a democratic literature, with more eminent names than supreme names, but with the promise of wide popularity and influence for any by whom its aspirations should really be interpreted.

The intellectual glories of her Majesty's reign could only have been foretold by one gifted with insight below the surface of things. The actual aspect at her accession was not encouraging. The great burst of poetry had exhausted itself, and impassioned prose had not yet taken its place. The great lights were extinct or dim. Scott and Bentham had been dead five years, Coleridge three; Wordsworth, Southey, Moore, Campbell, and Rogers lived, but wrote no more. Leigh Hunt was yet to write much charming criticism, and Landor and De Quincey were still at their best, but evidently incapable of further development. Tennyson was known enough to be ridiculed, and Browning not at all. Carlyle's 'Sartor Resartus' had 'excited

universal disapprobation' in the readers of the magazine which gave it a refuge, and Mill's blow for his 'French Revolution' was still to be struck. Mill himself, with Macaulay and Thackeray, wrote merely in periodicals. Dickens, however, had just shown with what suddenness, and from what unexpected quarters, genius may spring to light. Bulwer and Brougham were, at all events, displaying extraordinary productiveness. Hallam had just surveyed the literature of modern Europe, and Whewell had made himself the historian of the inductive sciences, for which Herschel, in his 'Preliminary Discourse,' might almost be said to have legislated. Jeffrey and Sydney Smith were resting on their laurels, but the latter was always ready for a battle. Disraeli, Marryat, Miss Martineau had established solid claims to attention in their special fields. Austin had laid the foundation of a reformed jurisprudence, and Lockhart had just begun to publish the most charming of biographies. The general mass of literature, nevertheless, seems to us now poor, insincere, and tainted with the sickliness of the coterie. Yet encouraging symptoms were not wanting. The abuse of venal puffery, which had reached an unexampled height, had in a measure cured itself. The reduction of the newspaper stamp (1836) had increased the number of readers and the inducement to read. The good effects of the great outburst of excellent cheap literature about 1830, were beginning to be perceptible. Such undertakings as 'The Pictorial History of England' showed the extension of the circles to which serious literature might appeal. The character of reviews was undergoing a change, formal notices of books were giving place to monographs on subjects which the books merely served to introduce, and were often wrought to a very high degree of literary excellence. But, more than all, problems were pressing upon the public judgment and

the public conscience which compelled the pen to be invoked as the alternative to the sword.

The arrangement of so varied a series of incidents as the literary events of the reign of Queen Victoria is a matter of considerable difficulty. If a merely chronological sequence is adopted, the reader will be bandied about from one subject to another, and will be unable to gain a comprehensive view of any. At the same time, accurate chronology is a matter of first-rate importance. The best method, on the whole, would seem to be to remit chronology to a general table at the conclusion, and follow the four great streams of history, philosophy, poetry, and fiction in their leading writers, beginning from the first event in each, after the Queen's accession, which can be regarded as serving to mark an epoch. It would be undesirable to dwell too long on any of these subjects to the exclusion of the rest. We therefore propose to proceed at first only to 1858, the year in which the first subject born under her Majesty's reign would attain his majority, that in which India was brought under the direct authority of the Crown, and immediately preceding those publications of George Eliot and Darwin by whose influence the latter part of the Victorian era is coloured as distinctively as the earlier part is coloured by Tennyson and Carlyle. It will then be necessary to turn back and notice such books and literary events as do not fall under any of the above four sections; and the second part of the reign will be treated in the same manner as the first. The most convenient epochs of commencement, taken from the points of departure indicating that a new spirit is actually in the ascendant, are perhaps, for history, the publication of Mill's review of Carlyle above referred to, July 1837—for philosophy, the publication of Whewell's 'Philosophy of the Inductive Sciences,' May 1840—for poetry, the appearance of Tennyson's collected poems, 1842—for fiction, the completion of 'Oliver

Twist' (the first work of fiction written by Dickens under the reign of her Majesty), 1838. Minor branches of intellectual activity need no exact chronology, and some very important ones are treated elsewhere in this volume, or excluded by its plan. Science, in its physical and philological aspects; art, pictorial, plastic, or musical; divinity, apart from ecclesiastical history; and the acted drama, do not here concern us. The exclusion of such works as Newman's 'Apologia' and 'Ecce Homo' from our survey is to be regretted, but is evidently imperative.

A word may here be said in anticipation of a probable remark that a survey of English literature alone must be very partial and insular. It may be urged that it ought to be considered in its relation to the literature of the civilised world. Were this true to the fullest extent, there would still be no space for any further information than the announcement of such obvious facts as the indebtedness of Carlyle to Fichte, of George Eliot to Comte, and of Matthew Arnold to Goethe. In fact, however, the direct obligations of the literature of our age to foreigners are not extensive. The writers named, superficially the most indebted, are essentially among the most original we possess. We have followed our own course, neither much influenced by, nor greatly influencing, the Continent. Foreign literature has played an important part in creating the environment to which, in Spencerian phrase, we have had to adjust ourselves; but there has been no such powerful and evident action as Italy exerted in the days of Elizabeth or France at the Restoration. The only noticeable exception to the truth of this remark is the existence of a small but active and influential school of avowed disciples of Auguste Comte.

In endeavouring to depict the changes of thought which have affected the conception and composition of history

during the Victorian epoch, especial account must be taken of three principal factors, the biographical, the documentary, and the statistical. We strive to realise the chief personages; we resort to letters and State papers for the secret springs of action and the raw material of narrative; we employ statistical research to learn how it fared with the masses of humanity outside the court and the camp. These tendencies were to a considerable degree united in the first great historian who made his mark on the Victorian era, Thomas Carlyle, and each is represented by one of his principal books. He was, indeed, no statistician, for statistics tend to fatalism, which doctrine Carlyle, in his 'Sartor Resartus,' had referred to the inspiration of the Everlasting No. But his 'French Revolution,' published just before the commencement of the reign, is a history whose hero is the People. It could not have been otherwise; Carlyle could not write without a hero, and, unless he could have accepted Napoleon, the Revolution afforded him no other. By this great work he gave an immense impulse to that habit of thought which regards mankind in the mass as the proper subject of the historian, no less than of the moralist. Yet, in his next book, he espouses the opposite view. 'Hero Worship' (1840) is the apotheosis of the personal element in history. 'The history of what man has accomplished in this world is at bottom the history of the great men who have worked here.' Apart from its inculcation of this grand half-truth, the book is memorable as a protest against low views of history and the sentiment expressed in the saying that no man is a hero to his valet. When, however, Carlyle selected a special great man as his hero, he found himself compelled to defer to the genius of his age, and become a documentary historian. The authentic image of Cromwell could not be restored otherwise, insomuch that, in his 'Letters and Speeches of Oliver

Characteristics of Victorian history.

Carlyle.

'French Revolution.'

'Hero Worship.'

'Letters and Speeches of Oliver Cromwell.'

Cromwell' (1845), Carlyle, considerably against his will, gave the example of a history depending for its value upon documents. Three more eminently epoch-making books were never written by the same man, and each has given a distinct impulse to history. Some time nevertheless elapsed before any writer of genius came forward as Carlyle's disciple in history. At length (1856), Mr. Froude undertook a more arduous task in his 'History of England under the Tudors.' It was more difficult to revise history by the aid of innumerable State papers than to print Cromwell's utterances with a commentary. Mr. Froude failed mainly from want of sound judgment; but if his work did not greatly elucidate the age of Henry VIII., it adorned the age of Victoria by its singular beauty of style.

Froude, 'History of the Tudors.'

Macaulay.

The most brilliant and popular historian of the day was no disciple or even admirer of Carlyle; and yet Macaulay's history of the English Revolution (1848–60) is substantially a work in Carlyle's manner. It resembles the 'History of the French Revolution' in so far as it deals even more with the currents of national feeling than with individual action: it is imbued with the spirit of 'Hero Worship' in the author's loyalty to *his* Cromwell, William III. The superficial dissimilarity of style cannot conceal the substantial identity of aim. Both authors labour for effect, but by opposite methods. Carlyle might fairly be called the Rembrandt of history, and Macaulay its Rubens. Though a characteristic production of the age, Macaulay's history had little influence upon contemporary thought. He has no pretensions to the character of a philosophical historian, though few works answer better than his to the definition of history as philosophy teaching by example. He had no new evangel to announce, and the maxims enforced by his unrivalled advocacy were not at the time seriously impugned. His turn will come in the day of

revolution, when his pages will be resorted to for arguments and examples of traditional, legal, and constitutional methods of dealing with a political crisis. For the moment, his reputation is beneath his desert. Dull men will not believe that so brilliant a writer can be sound; while the splendour of his diction, and, it must be added, his habit of exaggeration for rhetorical effect, blind even judicious readers to the massiveness of his common sense.

Minor historians.

Macaulay's work forms a connecting link between the new school of history and the old. Passing over books so manifestly inadequate as Lord Mahon's 'England' and Alison's 'Europe,' so confessedly limited in scope as Smyth's brilliant lectures on the French revolution, and Miss Martineau's able compendium of the 'History of the Thirty Years' Peace' (1849–50), or so entirely beneath the standard of historical dignity as Burton's otherwise meritorious 'History of Scotland,' we find the older school of narrative chiefly represented by a group of classical historians. Greece enlisted in her service one of the most powerful minds of the age, and one of the most refined. Bishop Thirlwall certainly rivalled Gibbon and Macaulay in mental calibre, and the inferior reputation of his 'History of Greece' (1834–47) is one proof among many of the supreme importance of striking diction. But still more powerful causes concurred. Writing for a cyclopædia, he inevitably worked with a feeling of constraint; and, though he cannot have underrated the difficulties, he seems to have imperfectly realised the grandeur of his undertaking. Hence he is always a little below his subject, and a little below himself; he delights and instructs, but he does not satisfy. Grote's history, on the other hand (1846–55), is one of the most remarkable monuments ever raised by the pure unselfish enthusiasm of scholarship. It is Philhellenism incarnate, and the noblest form of intellectual passion, that expends

Histories of Greece and Rome.

itself not only in rapture but also in effort. Grote's lover-like affection for Greece carries him into every recess of history, and he leaves none unenlightened by every ray that knowledge and industry can contribute. The great recommendation of his book to the student is also its great defect as a work of art. Investigation impedes narrative; the reader, continually summoned to exercise his judicial faculties, can but rarely release his imagination or yield himself to emotion, and the writer's well-deserved fame is a mixture of that of the historian and of the critic. Thomas Arnold, the third member of this group, wanted no qualification of an historian but leisure. He wrote admirably, he realised vividly, he sympathised with human actors, and apprehended human institutions—but he was the head-master of a great public school. Throughout the first two volumes of his 'Roman History' (1838–43) he felt overshadowed by his master Niebuhr, and the volume which fully disclosed his powers was cut short by his premature death. His history was united to Gibbon's by the labours of Long and Merivale, patterns respectively of severe and of elegant scholarship; but the popularity of Mommsen's great work, now thoroughly naturalised among us, stands in the way of English historians of republican Rome, though space is still left for the sceptical criticism of a Cornewall Lewis ('On the Credibility of Early Roman History'). Gibbon also found a direct imitator in the Victorian age in the person of his editor, Milman. The 'Decline and Fall' was evidently the prototype of the latter's 'History of Latin Christianity' (1854–55), a luminous, orderly, impartial view of a vast subject, perhaps not as yet sufficiently explored to form the theme of an authoritative history. In a succession of sterling histories, Finlay supplemented the work of Gibbon as respects the modern Greeks, and brought their story down to his own day.

Biography, that history in little, also underwent considerable modifications in the period under review, partly arising from the demand for the gratification of a minute curiosity, partly from the growing disinclination of biographers to interpose themselves between their hero and their public. This feeling particularly contributed to give shape to Stanley's 'Life of Arnold' (1844), which may be regarded as the representative biographical book of the period. The gain to knowledge was great, the advantage to literature questionable, for the less the biographer endeavours to impart artistic form to his material the more he declines from the rank of author to that of editor. Lord Campbell's 'Lives of the Chancellors' (1846) showed how entertaining a bad and careless biography could be; and Carlyle's 'Life of Sterling' (1851) proved that masterpieces of biography could still be written on the old plan; gossip seemed not out of place in Miss Strickland's 'Lives of the Queens of England' (1840). For the rest, the unexampled accumulation of particulars has provided the present generation with fuller information respecting its great men than any previous generation ever enjoyed, and, when the time for a general sifting of nineteenth-century literature shall have arrived, may yet afford posterity the materials for biographies of really classic execution. Such work of this kind as the present age can show was mostly made possible by the tendency of reviews to substitute essays for criticism, which produced admirable cabinet portraits by Macaulay, Carlyle, and others of less note. Among the numerous publications of diaries, that of Moore's by Lord John Russell and Haydon's by Tom Taylor (both in 1853) were the most remarkable. Biography.

Another sub-department of history, politics, rarely attains to historical dignity. No Burke or Junius, or even Cobbett, adorned the age of Victoria. Parliamentary elo- Politics.

quence does not fall within our province; views of society founded on statistics, such as the useful publications of Kay-Shuttleworth and Laing, do not rank as literature; and, but for Fonblanque's reprinted articles (1837), and Herman Merivale's and E. G. Wakefield's essays on Colonisation (1840 and 1849), the first period of the reign would be almost barren, if Carlyle's 'Past and Present' (1843), with its precursor 'Chartism' (1839) and its satellites the 'Latter-Day Pamphlets' (1850), did not seem on the whole referable to politics. 'Chartism' is an enlarged review article, the 'Latter-Day Pamphlets' are very gusty and smoky. The harmonising in 'Past and Present,' however, of the truth there is in individualism and the truth there is in socialism, is an achievement only possible to the deepest insight and the highest genius. The wonderful reproduction of a bygone epoch in the chapters devoted to Abbot Samson is an illustration of the value of another historical movement of the time, the publication of ancient records and chronicles. Carlyle would not have heard of the abbot but for the publication of 'Joceline de Brakelonde' by the Camden Society—a body formed with this object in 1838, and which, though not always sufficiently discriminating, has done and is doing excellent work. Many similar societies co-operated with more or less effect, and private publications of documents were numerous, the most important being the edition of Nelson's despatches by Sir Harris Nicolas, and of Wellington's by Colonel Gurwood (both in 1844). Archæology, the science which unites history with art, was enriched during this period by books ranking at the head of European literature in their respective subjects—Wilkinson's 'Ancient Egyptians' (1837), Dennis's 'Etruria' (1848), and Mr. C. T. Newton's account of his discovery of the Mausoleum.

'Past and Present.'

Historical societies.

Official despatches.

Archæology.

The same direction that we have remarked in the history

is, on the whole, followed by the philosophy of the period—a tendency to get rid of abstraction and convention, to concern itself with human interests and aim at practical results, and, as a means to that end, to resort to methods accessible to the ordinary understanding. Its watchword is given in a remark of Professor Masson's, 'Nothing is more notable than the extent to which philosophy has of late passed into cosmology.' It is not merely that physics have gained students at the expense of metaphysics, but that metaphysical inquiries have been more and more conducted by physical methods. Metaphysic has become psychology, and psychology has been based on physiology. Biological discovery has been the principal instrument of progress, and the names to be chiefly recorded in connection with it are Darwin and Herbert Spencer. The first important philosophical movement of the reign had seemed to point in another direction The ideas imported by Coleridge from Germany had been adopted by the ablest thinkers of Cambridge, once the stronghold of the experience-philosophy of Locke. In May 1840, Whewell, soon to become Master of Trinity College and the leading resident member of the University, published his 'Philosophy of the Inductive Sciences,' in which he affirmed the conclusion that 'our knowledge contains an ideal element, and this element is not derived from experience.' In Oxford, on the contrary, opinion was silently revolutionised in the opposite direction by the introduction as a text-book of Mill's 'Logic' (1843).

Philosophy in general.

Whewell.

Mill's 'Logic.'

The movements of both Whewell and Mill nevertheless bore within them the germs of failure, at least as regarded their own age, for Science had become the arbiter of opinion, and neither could be cordially accepted by scientific men. Science, admitting no other test of truth than experience, is constitutionally indisposed to an intuitional philosophy; and, although Mill rejected intuition, he

followed Hume in denying any demonstrable connection of cause and effect, a connection assumed by every experimental philosopher. Science had, accordingly, to create a philosophy of her own. The want was supplied by the efforts of two remarkable thinkers—Bain, author of 'The Senses and the Intellect,' with its sequel, 'The Emotions and the Will,' and Herbert Spencer, at first distinguished as a writer on social subjects, but whose 'Principles of Psychology' (1855), with his subsequent 'First Principles' (1862), is the most characteristic embodiment of the English philosophical thought of its age. Bain's works were remarkable for their investigation of mental phenomena by the light of nervous anatomy, thus tending to make philosophy an exact science; Spencer's for their application of the governing idea of the age, evolution. This weighty word, though already familiar to biologists—see especially Eichwald, 'De regni animalis limitibus atque evolutionis gradibus' (1821)—was first pronounced in its philosophical sense, so far as hitherto ascertained, by Professor Nichol in 1850, but merely as the running title to a page of his 'Architecture of the Heavens.' Spencer employed it deliberately in a communication to the *Leader* newspaper in March 1852. To him belongs the distinction of having first given philosophical currency to the ideas which Darwin, who had been working quietly on his own line since his return from his voyage in 1836, was to disseminate far more widely and verify by investigation in the field of actual phenomena. To Spencer we are indebted for the philosophical presentment of the subject, and in particular for the generalisation, based on the observations of many physiologists, of the hereditary transmission of faculties and propensities, by which the controversy between the theories of intuition and experience has been finally adjusted. Ideas, it is now admitted, are innate in so far as the predisposition to receive ideas of a particular de-

Spencer and Bain.

Evolutionary theory.

scription is born with every individual. The celebrated comparison of the infantine mind to a sheet of blank paper is entirely fallacious. But ideas are not innate in the sense of being naturally inherent in the mind, but have been derived from its physical progenitors, upon whose individual experience their complexion depends. This settlement of an immemorial controversy by an appeal to physiology was well calculated to facilitate the transition of metaphysics into physics; and during the period of which we are treating, ere reaction had been provoked by the materialising tendency of doctrines grounded on biological observation, mere philosophical speculation, at no time highly congenial to the positive character of the Englishman, remained in a very languid state. Sir William Hamilton's doctrine of the 'Relativity of Thought,' enunciated in his collected essays (1852) and his edition of Reid (1846), was indeed destined to excite vehement controversies, especially in the department of theology; but these belong to a later period. Professor Ferrier's 'Institutes of Metaphysics' (1854) attracted little notice, but have survived him. The history of philosophy was advanced by the same writer's brilliant lectures on the early Greek philosophers, and popularised by G. H. Lewes's compendium (1845–46), afterwards much enlarged. This confessedly superficial book further marks an era as containing the first serious recognition of Comte, whose 'Positive Philosophy' was shortly afterwards adapted for English readers by Miss Martineau and Lewes himself.

Metaphysics.

History of philosophy.

Logic took a great step in advance by Boole's two epoch-making books, 'The Mathematical Analysis of Logic' (1847) and 'An Investigation of the Laws of Thought' (1854), aiming to combine logic with mathematics, as Spencer and Bain combined metaphysics and physiology. De Morgan effected much in the same direction. Sir William Hamilton,

Logic.

his distinguished follower Mansel, and others also made important contributions to logic.

Political economy.

In political economy the most remarkable works were M'Culloch's (1849) and Stuart Mill's (1848), the latter of which was very generally accepted as the crowning of Adam Smith's edifice. The reaction against it belongs to a later date. Mr. Herbert Spencer's study of Malthus produced a most remarkable criticism, 'A New Theory of Population deduced from the General Law of Animal Fertility' (1852), in which the limitations of the law established by Malthus were pointed out.

Sociology.

As previously observed, Auguste Comte is perhaps the only foreign writer who has profoundly affected English literature during our age. A new development of research, clumsily but conveniently entitled 'sociology,' is his especial creation. A considerable proportion of the books written during the early Victorian period may be described as the raw material of sociology, for never were social questions more assiduously investigated. Comte, however, raised these inquiries to the dignity of a science, which was inaugurated in England by the 'Social Statics' of Herbert Spencer (1850).

Relation of Victorian poetry to that of the preceding age.

That alliance of imagination with practical aims which we have remarked in the history and philosophy of the Victorian age is, as a rule, equally characteristic of its poetry, but there is no such apparent break of continuity with the best literature of the preceding generation. The highest poetry being in its nature prophetic, and the first quarter of the nineteenth century in England having been one of the most remarkable of all poetical eras, the work of the next fifty years was naturally prefigured by it, and Tennyson and Browning appear the heirs of Wordsworth and Coleridge, Shelley and Keats. Whatever, notwithstanding, is most truly characteristic of the culture and

thought of the first Victorian period is impersonated in Lord Tennyson, and the posterity that may wish to learn the maturest judgment of the most refined circles in his day will find no source of information comparable to his poems. The Queen's accession found him silently framing for himself that theory of life demanded from him by Stuart Mill, the most judicious critic of his early writings. By 1842 he was able to publish the two volumes ('Poems, chiefly Lyrical') by which every marked tendency of the age is represented, in which every order of mind can find something peculiarly its own, and which, nevertheless, is throughout perfect harmony and organic unity. In 'The Princess' (1847) he touched the most serious temporal question of the day, and in 'In Memoriam' (1850) he gave the best reply it knew to the question which is eternal. In 'The Idylls of the King' (1859) he afforded the strongest proof possible of his identification with the spirit of the age by producing a Victorian epic in the guise of an Arthurian one; while, by a singular contrast, the strength of 'Maud' (1855) is not in the references to the national contest with Russia, its professed theme, but in the purely lyrical passages. The canto beginning 'I have led her home' is the highest poetical flight of the author and the age.

Tennyson.

If the varied and sometimes conflicting tendencies of the time are reflected by the Laureate, its master-passion is incarnated in Robert Browning. Browning is essentially the poet of man. He can make poetry of anything, so long as it concerns a human being. In a dramatic age he would have been a great dramatic poet, but the conditions of his time, unfavourable to this kind of excellence, have led him to devise dramatic situations rather than complete plays, and to cast his best thought into intense, impassioned monologues. During the earlier years of the Queen's reign, nevertheless, he essayed dramatic composition in the remark-

Robert Browning.

able series of plays quaintly entitled 'Bells and Pomegranates' (1842-46). Particular passages in these have not been surpassed by him or by others; but the superiority of his art when working in freedom from every conventional restraint, was proved in 'Men and Women' (1855)—fifty wonderful human portraits, or glimpses of portraits—the best, but by no means the largest portion, of the extraordinary series which a life devoted to poetry has been employed in producing. On the peculiarities of style which heighten his originality while limiting his sphere of influence, this is not the place to enlarge. His gifted wife, Elizabeth Barrett-Browning, though altogether exceptional in her learning and attainments, nevertheless represents average womanhood in Victorian poetry. However peculiar and mystic the expression, the sentiment invariably bears the stamp of the sensitive and cultivated English lady of the nineteenth century. It follows that her genius is mainly lyrical. The so-called 'Sonnets from the Portuguese,' treating of emotions strictly personal to herself, are her best work. Her attempt at a nineteenth-century epic, 'Aurora Leigh' (1857), though displaying more mental power than any of her writings, is too faulty in construction to be durable. Faultiness of construction was indeed the besetting sin of the poetry of that day. Even the work of true poets, like Philip James Bailey ('Festus,' 1839) and Sydney Dobell ('Balder,' 1853), seems a string of similes. The evil was checked by a very remarkable piece of criticism, the preface to the collected poems of Matthew Arnold (1853). Mr. Arnold had practically shown by his previous publications ('The Strayed Reveller,' 1849, 'Empedocles on Etna,' 1852) the immense gain of symmetrical construction and chastened expression. Beautiful as is most of his poetical work, it is not too much to affirm that this memorable essay laid English literature under still deeper obligations. Except,

E. B. Browning.

Matthew Arnold.

indeed, in his purely narrative poems, such as the stately and pathetic epical episodes, 'Sohrab and Rustum' and 'Balder Dead,' Mr. Arnold appears either as a teacher or a learner. He is an academical poet, reflecting the mental attitude of the most cultured minds of his time, and also their obligations to antiquity and such moderns as Wordsworth and Goethe. The cosmopolitanism of a very brilliant writer, the Earl of Lytton, is of a more unrestrained kind, at home in every literature, but owing most to contemporaries such as Hugo and Heine. Mr. Coventry Patmore, on the other hand ('Angel in the House,' 1854-56), is no child of his age, and might almost pass for a poet of the seventeenth century. Had it been otherwise, his poetical treatment of English domestic life might have suffered from too exclusive an association with everyday concerns. But the pregnant style and subtle thoughts embalm the familiar matter, and the poet attains his aspiration of 'saying things too simple and too sweet for words.' Together with the writer who has lived to see his exquisite 'Ionica' prized at their worth, he constitutes a link with those who still adhered to the classical, or at least the Wordsworthian tradition of poetry. They were not numerous, or in general remarkable, although some of the best sonnets in the language were composed between 1830 and 1848 by Hartley Coleridge, who, like Milnes and Trench, Moultrie and Aubrey de Vere, mainly drew inspirations from Coleridge and Wordsworth. Arthur Hugh Clough, the bard of honest doubt, showed humour in 'The Bothie of Tober-na-Vuolich,' startling force in 'Dipsychus' and other fragments, and elsewhere a subtlety which made him the favourite poet of speculative minds. Henry Taylor produced meritorious dramas, but no second 'Philip van Artevelde.' Mrs. Norton in some measure represented the traditions of Byron. R. H. Horne ('Orion,' 1843) mani-

Earl of Lytton.

Coventry Patmore.

Wordsworthian school.

Clough, Taylor, Bulwer, Macaulay.

fested more affinity to Keats and Shelley. In his satirical 'New Timon' and his epical 'King Arthur,' Bulwer exhausted the resources of talent without attaining the results of genius. Barham's 'Ingoldsby Legends' were a masterpiece of metrical fun; and with his 'Lays of Ancient Rome' (1842) Macaulay won a great triumph in a narrow field. One of Emily Brontë's lyrics was sublime, and all her verse was poetry. Two distinguished men stood aloof. Hood, who under George IV. had written in an ornate style, and had since vied with Barham as a humourist, now melted all hearts by ballads of artless simplicity. William Barnes (first publication 1844), by far the best rural poet South Britain ever had, followed no model but nature. Lastly, a group of Irish bards won distinction in descriptive and lyrical poetry, but manifested little sensitiveness to the special influences of the nineteenth century. The one most in harmony with the general spirit of contemporary poetry was William Allingham, an artist in verse as well as a singer ('The Music-master,' 'Day and Night Songs,' 1855). Davis and his fellow-minstrels of the 'Nation' were merely singers, but their political verse was full of spirit and fire. An intermediate position was occupied by Sir Samuel Ferguson, whose 'Forging of the Anchor' ranks among the finest ballads of the period.

Hood and Barnes.

Irish poets.

Fiction in general.

In the age of Victoria, fiction has more and more assumed the place from which the drama has fallen, and become the mirror and the censor of contemporary manners. It has, consequently, been more affected than any other class of literature by the general tendencies of the age. Every novel is necessarily in some degree a work of imagination; and there are few of very considerable note in the Victorian period which the pressure of circumstances has not inspired with something of the utilitarian spirit as well. The progressive change may be observed in the writings of Dickens,

Dickens.

too well known to require enumeration or special description. The attack on the Fleet Prison in 'Pickwick,' for instance, is merely incidental; that on the Court of Chancery in 'Bleak House' is the foundation of the book. It must, however, be admitted that Dickens became a teacher not solely to meet the exigencies of public feeling, but also as a substitute for the buoyancy of animal spirits which upbore him so triumphantly until the completion of 'Martin Chuzzlewit' (1844), and failed him so signally afterwards. Thackeray, who next grasped the sceptre of contemporary fiction by the publication of 'Vanity Fair' in 1846, is, on the other hand, a conscious critic and professional satirist. As Dickens's novels celebrate the free exuberant vigour of English life, Thackeray's criticise its weaknesses and expose its affectations. In 'Vanity Fair' (1846), 'Pendennis' (1850), and 'The Newcomes' (1855) he is to the age of Victoria what Addison and Steele were to the age of Anne—its painter; not like his disciple, Anthony Trollope, its photographer. His own temperament deeply influences his pictorial handling: to assume the absolute accuracy of his pictures would be like inferring, from the too exclusive study of some modern painters, that the men and women of the Victorian epoch invariably lived in rooms hung with yellow.

Thackeray.

For a corrective to Dickens's genial unveracity and Thackeray's exaggeration of satire we must look to a new order of writers, who, learning from Dickens to multiply the resources of fiction by resort to a lower social stratum, and sharing Thackeray's aversion to the shams and conventions of the higher, united abhorrence of evil to faith in good. Mrs. Gaskell's 'Mary Barton' (1849) and 'Ruth' (1853), Miss Mulock's 'John Halifax' (1857), and Charles Kingsley's 'Yeast' (1851) and 'Alton Locke' (1850), may be accepted as representatives of this class.

Social improvement aided by novels.

Equally remote from Dickens's sentiment and Thackeray's sarcasm, they treated social problems sometimes in a bitter and indignant, but mainly in a hopeful spirit, and rendered fiction more distinctly than ever a moral teacher and an instrument of legislative progress. While Thackeray, conscious of having accomplished his mission as a delineator of contemporary manners, sought an asylum in the eighteenth century ('Esmond,' 1852, 'The Virginians,' 1858), Kingsley carried the spirit of the nineteenth century into the past ('Hypatia,' 1853, 'Westward Ho,' 1855); and Bulwer, reversing Thackeray's practice, abandoned the historical novel, of which he had given brilliant examples in 'The Last of the Barons' and 'Harold,' for pictures of contemporary life. The form of 'The Caxtons' (1848), 'My Novel' (1853), and 'What will he do with it?' (1858) is borrowed and affected; but few books are richer in the ripe genial wisdom of an accomplished man of the world. Another form of novel received a remarkable development at this period. Benjamin Disraeli, subjective as Byron, had himself been the involuntary hero of all he wrote. The ambitious boy who had dreamed in 'Vivian Grey;' the half-poet, possessing the 'vision' but wanting the 'faculty,' who had rhapsodised in 'Contarini Fleming;' the dandy, who had sketched fashionable society in 'Henrietta Temple,' was now the party chief. 'Coningsby' (1844) was the most brilliant criticism of the antiquated and insincere element in the politics of the day; 'Sybil' (1845) propounded the author's favourite idea of the alliance of the aristocracy and the artisans; the Oriental projects of 'Tancred' (1847) would seem wholly visionary if the author had not lived to realise some of them. The special department of Irish fiction was ably occupied by Charles Lever, almost the only member of Dickens's school who is still read, and by William Carleton. Lever gave Irish humours, but Carleton truly depicted Irish life.

Bulwer.

Disraeli.

Irish novelists.

Even the mass of circulating library fiction felt the influence of a more earnest time, and, if exhibiting little absolute merit, was at all events less silly and vapid than of old. A few writers stand apart: Robert Landor, whose romances are classical in every sense; the Baroness Tautphœus, whose 'Initials' combined exquisite observation with the excitement of narrative; Charlotte and Emily Brontë, whose intense natures found utterance in impassioned diction and situations of thrilling power; and George Borrow, who alone among Victorian novelists possessed the secret of compelling belief in romantic incidents by matter-of-fact handling. The truth of 'Jane Eyre' (1847) is psychological, that of 'Lavengro' (1851) external; but they are equally irresistible in illusive power.

Brontë family and Borrow.

The four principal divisions of intellectual labour here imperfectly described, are of course very far from comprising all the manifestations of literary activity during the period under review. No department, perhaps, was so widely cultivated and influential as that of criticism, which eludes detailed examination from being diffused through a multitude of periodicals. The more important features of periodical literature will be more conveniently glanced at in another place. Generally speaking, critics may be said to have been aiming at the point of view of the Coleridges, Hazlitts, and De Quinceys of the preceding generation, and to have gained very considerably in insight and earnestness. One very great writer, Ruskin, developing hints already given by Shelley and De Quincey, showed what criticism may be when united with a poetical temperament. The appreciation of his æsthetic teaching belongs to another department of this work; but literature no less than art responded to his passionate demand for absolute veracity and his assertion of the substantial oneness of utility and beauty. The most vital portion of this

Criticism.

Ruskin.

teaching was adapted from Carlyle, but the unequalled splendour of Ruskin's diction recommended him to many whom Carlyle repelled. Along with the critical dithyrambics of 'Modern Painters' and 'The Stones of Venice' may be named another development of picturesque authorship, idealised travel—a weary business in incompetent hands, but delightful in such examples as Kinglake's 'Eōthen' (1844) and Borrow's 'Bible in Spain' (1843). Ordinary travels abounded as now, and as now exhibited every degree of merit and demerit. Two came to rank as classics. Darwin's 'Voyage of the "Beagle"' will long remain the model of the scientific traveller, incomparable for its ardent yet temperate passion for truth and the power of effortless word-painting. Layard's discovery of Nineveh was the most brilliant stroke that a traveller ever made, and a less able account of it than the explorer's (1849) would claim a permanent place in literature. Miss Martineau's 'Eastern Life, Present and Past' (1848), and Chorley's 'Music in Germany' are remarkable examples of didactic travel undertaken for a special purpose.

Literature of travel.

The aids to literary culture in which this period was prolific—such as the free library system established in 1850 by Mr. Ewart's Act—hardly belong to this subject except in so far as they exerted a direct stimulus upon authorship. Such was, in a certain measure, the case with the wide diffusion of lecturing, which, by bringing Emerson to England in 1847, acquainted popular audiences with the remarkably pure and spiritual form which the idea of culture had assumed across the Atlantic. The rhetorical art also had powerful representatives in W. J. Fox and George Dawson; on the whole, however, literary oratory has not been widely influential in this country, and has tended more and more to connect itself with education in the narrower sense.

Free libraries.

Lectures.

Literature derived substantial encouragement from a legal enactment, the Copyright Act of 1842. In 1839 Carlyle had petitioned that literary pirates might be prohibited from stealing for sixty years, 'after which, unless your honourable House provide otherwise, they may begin to steal.' The term was deemed too long in the interests of public policy, and, after a brief controversy between Talfourd and Lord Mahon on the side of the authors, and Macaulay on the side of the public, the question was eventually settled by an Act determining the period of protection at forty-two years. The overthrow of the system of high retail prices and the introduction of liberal discounts in 1852 should also be recorded as circumstances highly encouraging to the diffusion of literature.

Copyright Act.

Booksellers' discounts.

Nor must the naturalisation of American literature be left unnoticed. This will probably be one day regarded as the most important of all incidents in English literary history, taking its destinies out of the hands of domestic cliques and coteries, and indefinitely expanding both the area of its influence and the agencies by which it is to be moulded for the future. For the time it added to the circle of popular domestic writers two of undoubted genius, Emerson and Hawthorne, and one of less native power, Longfellow, who seemed commissioned to remedy the most serious defect of the poetry of the day—the absence, generally speaking, of any element appreciable and enjoyable by the masses. Thanks mainly to him, contemporary poetry did not cease to exist for circles not insensible to the charm of verse because their culture did not enable them to appreciate its very highest manifestations. It is much to be desired that his example of perfect simplicity and transparency should produce its full effect. The value of what is generally comprehensible must rise in proportion as the English language advances towards its probable destiny of becom-

American literature.

Diffusion of the English language.

ing a universal means of communication among the nations of the earth.

Modification in spirit of Victorian literature.

The transition from the earlier to the later period of Queen Victoria's reign is accompanied by a modification of mental attitude and atmosphere. Tennyson is no longer the truest representative of the era, the spirit of which is more perfectly expressed by the most serious and purposeful of novelists, George Eliot. There is less faith, hope, and imagination; more earnestness, system, and science. This may be partly ascribed to the disappointment of oversanguine expectations from political reform, partly to the increasing perception of the magnitude of social evils, partly to the succession of calamities—the Crimean war and the Indian mutiny, the death of the Prince Consort, and the cotton dearth, which saddened while they exalted the spirit of the nation—but chiefly to the growing preponderance of the scientific view of life.

Influence of Darwinian theory.

The great intellectual event of the age, dividing its chronology as with a watershed, was the publication of Darwin's 'Origin of Species' in 1859. The influence of this work was quite independent of the acceptance of the author's theory in the special field of biology. It firmly established a new method of regarding society, no less than nature, which controlled thought in every department. The absolute sway of Law, long proclaimed by science, was brought home to the man of ordinary culture, and all laws seemed reducible to the one principle of Evolution. The noblest teaching of the preceding era found itself corroborated. Carlyle's scorn of formulas and paper constitutions was justified, since nothing could come into existence but from an antecedent germ; Ruskin's identification of utility and beauty was confirmed, for all beauty was shown to be an adaptation to a useful end. Whatever was serious in

contemporary thought profited, whatever was merely capricious crumbled away. It destroyed much in which the untrained imagination had delighted, and its substantial consolations brought with them grave joy not unallied to sadness. The resort for arguments and illustrations to the natural world also tended for a time to invest the doctrine with a more materialistic aspect than properly belonged to it. Some consciousness of error in this direction may perhaps be detected in the latest utterances of the chief thinker of the reigning school, Mr. Herbert Spencer, whose former speculations, now that Darwinism had become the prevalent biological doctrine, wore the aspect of fulfilled prophecies. His 'First Principles' (1862), the first number of a philosophical series designed to be all-embracing, is the most characteristic bequest of the Victorian age to posterity. With all Mr. Spencer's efforts, however, psychology was still far from an exact science, and his triumph contained the germs of reaction. The transformation of metaphysics into psychology seemed to many to involve a further passage into biology. Such was the view of Lewes ('Physical Basis of Mind') and Maudsley ('Mind and Brain'). This was not a conclusion in which mankind could generally acquiesce, and metaphysics revived in their turn. While Mill (1863) was endeavouring to deal a final blow at the intuitional philosophy in the person of Sir William Hamilton, Hamilton's theory of the relativity of human knowledge, invoked by theologians to disable human judgment in the region of the supernatural, excited a controversy which at least showed in how wide a field the choice yet lay between metaphysics and agnosticism. At a later period Coleridge's philosophical bequest was tardily administered by his executor, Joseph Henry Green; and Thomas Hill Green, in the act of editing the philosophy of Hume, subjected it to acute criticism. A school of Oxford Hegelianism, continually

Herbert Spencer.

Materialism.

Metaphysics.

rising in importance, owes its being to this able thinker, so prematurely snatched away.

After all, however, the philosophy of evolution professed by Spencer remained the characteristic philosophy of the reign of Victoria, and the only one whose promulgation was attended by momentous consequences. It was carried by its author into politics and morals. 'The Data of Ethics' (1879) subjects moral action to an analysis yielding something different from the old utilitarianism, on which the emotional though clear-headed Stuart Mill had already sought to refine. Mr. Justice Stephen's defence of the original phase of the doctrine is an interesting example of the way in which opinion is governed by temperament. In ethics, as in psychology and sociology, Mr. Spencer is our only great systematic writer; but the age produced one golden manual on a special department, one penetrating critic, and one dignified judge. Mill's 'Liberty' (1859) is to general freedom of thought and conduct what Milton's 'Areopagitica' had been to the liberty of the press. Mr. Matthew Arnold strove to reconcile philosophers with theologians, and thinkers with practical men, in his 'Literature and Dogma' and writings of a similar tendency. Dr. Martineau, the champion of intuitive ideas, of the innate moral sense, of the freedom of the will, of everything antagonistic to the reigning views, familiar throughout a long life with all 'types of ethical theory,' mustered and judged them all in the book thus entitled (1885): a work unapproached by any contemporary in austere yet seductive beauty of language and sentiment. Sidgwick's 'Methods of Ethics' (1874) was another masterly investigation of the various sanctions of morality that have obtained among men. Ethical problems were also canvassed in delightful dialogues by William Smith ('Thorndale,' 'Gravenhurst'), and treated in a highly suggestive if mystical manner in J. H.

Ethics.

James Martineau and H. Sidgwick.

Hinton's 'Mystery of Pain' and with chilling good sense in W. R. Greg's 'Enigmas of Life' (1873). The novel and unwelcome phenomenon of pessimism was analysed by James Sully. Sir Arthur Helps, the universally acceptable author of 'Friends in Council,' though distinguished in many fields, may, on the whole, be classed with ethical writers.

Study of Greek philosophy.

English philosophic thought was perhaps more deeply affected in this than in the former period by the influence of antiquity and of the Continent. Grote, who had retired from political life to write the 'History of Greece,' with like devotion consecrated his latter days to a great work on Plato, embracing a number of collateral topics, and another on Aristotle, which unfortunately remains a fragment. Lewes wrote on Aristotle's physiology and Sir Alexander Grant on his ethics, and Plato became better known than heretofore by the dissertations accompanying Mr. Jowett's translation. Kant's metaphysic, just re-enthroned in Germany, was made more accessible to England by Mahaffy and Caird, while his ethics were popularised by Miss Power Cobbe ('Essay on Intuitive Morals'). Pollock expounded and Martineau criticised Spinoza, and Dr. J. H. Stirling sought to impart the 'Secret of Hegel' (1865). Of all foreign influences, however, the most important was that exerted by Comte, whose dogmatism and despotism offended the best tendencies and traditions of the English mind, but who was nevertheless felt as a leaven working in intellects as little disposed to submit to his absolute guidance as Mill and Herbert Spencer. His strength lay, perhaps, in his systematising spirit, which was found useful in dealing with the accumulating mass of knowledge. Sociology, his especial creation, owes much to Harrison, Beesly, and others who, under his inspiration, occupied themselves with the adjustment of the differences between capital and labour.

Comtist school.

Historians of intellect: Buckle, Lecky, Leslie Stephen.

The influence of his example was also discernible in Buckle's remarkable but fragmentary 'History of Civilisation in England' (1858), a work singularly effective in style, which failed of permanent influence mainly through the author's ignorance of the theory of evolution. He had grasped too hastily at conclusions derived from mere statistics, and died ere he could remodel his book by the light kindled while its composition had absorbed him. Less ambitious in conception and brilliant in execution, Lecky's 'History of Rationalism' (1865) and 'History of European Morals' (1869) are of more durable worth. The noiseless growth of new ideas, and the transitions, imperceptible in origin, startling in result, from one region of thought to another, have never been exhibited with equal power. Mr. Leslie Stephen's 'English Thought in the Eighteenth Century' (1876), a truly learned work of the same class, is a rare instance of candid appreciation notwithstanding wide difference of opinion.

Characteristics of historians.

Writers of Buckle's class form a convenient connecting link between abstract thinkers and historians. The historical movement during the latter part of the Victorian epoch corresponds to the movement in philosophy. The tendency is to exact research at the expense of literary quality. Narrative, dramatic, and pictorial power, though not absent from the historians of the day, are not their most characteristic gifts or their chief titles to distinction. It was a natural consequence of this disposition to base history on original research that chief attention should be bestowed on the country whose records were most accessible—the United Kingdom itself. The opening of the Record Office to historical research (1858) was the natural sequel of the rescue and rearrangement of the records themselves twenty-five years earlier, and the stream of invaluable publications, especially calendars of State papers, which rapidly

Record Office publications.

proceeded from the Record Commissioners, powerfully encouraged the now dominant antiquarian school of history. This was especially influenced by two leading minds, Bishop Stubbs, the great constitutional historian of England (1874), and Mr. E. A. Freeman, who, though not in those days holding a professorship, might be regarded as the English representative of the professorial class of historian predominant in Germany. His 'History of the Norman Conquest' (1867), with the companion work on William Rufus, is the most characteristic and influential production of his school. It is, moreover, the work of a real historian, not of a mere historical critic, one endowed with a sense of art and symmetry, and able to paint a battle or a man. Its defects are those incident to the author's position as a pioneer in the field of history. He is compelled to argue while he narrates, and half his book reads like a commentary on the other half. The service, nevertheless, which he and Dr. Stubbs have rendered by instilling juster views of mediæval history, redeeming periods full of life and movement from the reproach of stagnation and barrenness, and especially by exhibiting the continuity of all history, can never be overestimated. His disciple, J. R. Green, attempting a school-book, produced a literary masterpiece, though his 'Short History' had both to be expanded and to be purged of many errors before, as 'The History of the English People,' it became a model of what condensation can effect. In his 'Making of England,' Green showed remarkable power of painting the external conditions that influence the life of a people. Other labourers in the field of early British history are so numerous that we can barely name Sir F. Palgrave's unfinished Anglo-Norman history, Pearson's volumes on the Anglo-Saxon and Norman periods, and Skene's 'Celtic Scotland.' The works of Guizot, Thierry, Lappenberg, Pauli, and Ranke were naturalised among us

Stubbs and Freeman.

Green.

by translations. The history of the Tudors has been undergoing reconstruction at the hands of the late Professor Brewer and others, some of whom seem to have substituted faith in mendacious ambassadors for Mr. Froude's faith in mendacious documents. The period of James I. and Charles I. has happily fallen into the hands of a very eminent historian, who to the sagacity and impartiality of a Ranke unites profound insight into the currents of national feeling ('England under James I. and Charles I.,' 1883). Mr. Gardiner's one defect is that he is more successful in laying bare the springs of action than in portraying the actors. The same remark applies to Mr. Lecky, who, however, writing the history of eighteenth-century England, found a subject appropriate to his peculiar talent when called upon to describe the condition of Ireland at the time. Few passages of recent historical writing are more masterly or more deeply instructive. The literary gifts of Kinglake, the historian of the Crimean war, would have amply sufficed to hand his book down to posterity. Unfortunately, the most brilliant parts are the least relevant, and the necessary is everywhere encumbered with the superfluous. Prolixity is more or less imputable to all historians of modern England except Mr. Cory, a pattern of pregnant brevity, Mr. Spencer Walpole, and Mr. Justin McCarthy. Mr. Froude's 'English in Ireland' provoked warm controversy. Kaye's history of the Afghan war is classical; but the marvellous story of the Indian Mutiny, though ably condensed by Mr. T. Holmes, has as yet found no adequate narrator on a fitting scale; and Mr. Rusden's gigantic accumulations for Australasian history are the quarry of the future.

Gardiner.

Other historians of England.

Indian and colonial history.

Ancient history: Hodgkin, Coote, Rawlinson.

Ancient history, though extensively studied, has of late years afforded material for but one very important English work. Mr. Hodgkin's 'Italy and her Invaders' (1880), still in progress, has shown that the episodes of the 'Decline and

Fall' admit of fuller treatment at the hands of an accomplished scholar endowed with the historic instinct, and that there is room for such a one even by the side of Gibbon. Mr. Coote's 'Romans in Britain' is on the borderland between history and archæology. The early volumes of Canon Rawlinson's series in the 'Seven Great Monarchies of Antiquity' labour under the inevitable defect of being based upon materials in process of continual augmentation, and as yet imperfectly understood. This does not apply to his valuable monographs on the Parthian and the Sassanian dynasties. Mr. Bosworth Smith has written the history of Carthage with lucid brevity and some partiality. Professor Dowson's edition of Sir H. Elliot's translations of the native Indian historians is a work of great extent and value, and Colonel Osborn and Sir W. Muir have elucidated the confused story of the caliphs.

History of foreign nations.

Foreign nations have of late taken such excellent care of their own history, and their languages are so generally understood in England, that the inducement to write of them has been greatly diminished. Carlyle's biography of Frederick the Great (1858–65) and Professor Seeley's biography of Stein (1879), however, are histories of unusual mark; and Mr. Fyffe, treating of modern Europe in a yet unfinished history, renders a service by superseding the wholly inadequate work of Alison. Mr. Bryce's essay on the 'Holy Roman Empire' (1873) was a luminous exposition of a subject which Mr. Freeman had already done much to elucidate. Ecclesiastical history, in this instance so intertwined with civil history as hardly to be separable, received a valuable addition in Canon Creighton's impartial 'History of the Papacy during the Period of the Reformation' (1882). Under Mr. Creighton's auspices also England has for the first time acquired, in the *English Historical Review*, a journal for the discussion of historical questions,

Ecclesiastical history.

Historical and archæological journals.

an institution of long standing on the Continent. Classical and Biblical studies already possessed similar organs in the journals of the Hellenic Society and the Society of Biblical Archæology, whose proceedings have proved important auxiliaries to history.

Biography.

No period abounded more than this in excellent biographies, but, from causes previously stated, few were qualified to take an independent place in the history of literature, apart from the importance of the subject. One such book was produced by Mark Pattison, before whose sight the life of Casaubon lay clear in its simple outline, unembarrassed by a superfluity of material. The book is a gem; and Sir George Trevelyan's 'Life of Macaulay' is another. Lewes's 'Life of Goethe,' Hamerton's 'Five Famous Frenchmen,' and Morley's lives of Voltaire, Rousseau, and Diderot are also distinguished from the mass of biography by their condensed treatment, which in the case of the first-mentioned was carried too far. Forster spoiled the lives of Dickens and Landor, and was arrested by death as he seemed about to succeed better with Swift. Among the numberless excellent biographical works composed on a larger scale, Sir Theodore Martin's 'Life of the Prince Consort,' Masson's Milton, Bosworth Smith's Lord Lawrence, and Dowden's Shelley may be selected for special mention. Mr. S. Smiles made a special department of the lives of engineers and heroes of the working class; and Sir J. W. Kaye of Indian commanders. No modern biography consisting chiefly of original documents can compare in interest with the journals of General Gordon. In 'Our Life in the Highlands' her Majesty herself gave her subjects an example of the simple and graceful treatment of the details of everyday life. Artistic biography was best represented by Gilchrist's 'Life of Blake,' and Tom Taylor's and C. R. Leslie's 'Life of Reynolds.' The most important work

in collective biography was Hook's 'Lives of the Archbishops of Canterbury.' Autobiography, the most fascinating form of biographical narrative, was enriched by the incomparably vivid reminiscences of Carlyle and the candid and manly self-portraiture of Mill; an autobiography by Mr. Ruskin, more discursive but less detailed, is now in course of publication. Publications of diaries were numerous. Two, the 'Greville Memoirs' and Crabb Robinson's 'Diary and Reminiscences,' afforded endless delight to the lovers of history and literature, the latter of whom also profited by the publication of Macvey Napier's correspondence as editor of the *Edinburgh Review*. The general tendency to prolixity was partially counteracted by the taste for abridgments conveying the substance of an author's life and work, which produced such masterly monographs as Morley's Burke, Morison's Gibbon, Jebb's Bentley, Colvin's Landor, Hasell's Calderon, and many others.

Autobiography.

Politics produced much writing but little literature, except Sir G. C. Lewis's 'Essay on the Formation of Opinion' (1844) and 'Methods of Observation and Reasoning in Politics' (1852); and numerous detached essays, some, like Mill's and Cairnes's on the American Civil War, of a very high character. Seeley's 'Expansion of England' struck a chord that vibrated through the nation. Mill's 'Subjection of Woman' was the most remarkable contribution to philosophical politics. In the higher departments of general jurisprudence and constitutional history, Sir Henry Maine and Sir Erskine May produced standard works of the highest importance, and the origin of social institutions was ably investigated by Lubbock, Tylor, McLennan, and other writers. No epoch-making work appeared in political economy, although the growing dissatisfaction with the established system of Mill, as represented after his death by Fawcett and Cairnes, produced a number of minor books

Politics.

Jurisprudence.

Political economy.

and essays, of which Ruskin's later writings were the most remarkable. Opinion on this subject, as well as on logic and economics in general, was greatly modified by the researches of W. S. Jevons, whose general tendency may be defined as the application of mathematical principles to the mixed sciences, but whose premature death prevented him from thoroughly systematising his conclusions. Bagehot, Courtney, R. I. Palgrave, Giffen, and Goschen took rank as the highest authorities on finance.

Travels.

Works of travels were innumerable, and the importance of many explorations, and the personal interest attaching to such explorers as Livingstone, Burton, Baker, and Vambéry, made them independent of mere literary criticism. 'The Voyage of the "Bacchante"' (1885) is an ample record of an undertaking conceived in a truly princely and imperial spirit. Sir Charles Dilke's 'Greater Britain' (1868) taught many to realise for the first time the greatness of the empire. Palgrave's 'Travels in Arabia' (1863) unite the charm of style to the charm of adventure. Tennent's 'Ceylon' (1850) is one of the most exhaustive accounts ever given of any country. Bates's 'Amazons' (1863) is a pattern of zoological travel, and Wallace's 'Malay Archipelago' (1867) made an era in natural history by its masterly discrimination of the Asiatic and Australian regions.

Literary history.

In this period the history of literature seemed a less attractive subject than formerly, a circumstance chiefly to be explained by the extent to which the subject was treated in periodicals. The most extensive and important undertaking in this department was undoubtedly Symonds's 'Italian Renaissance' (1875–86), a blending of literary, artistic, social, and political history. Henry Morley's history of English literature is unfortunately incomplete. Gosse's literary essays and lectures occupy the borderland between literature and biography. Matthew Arnold took the first

rank among the judges as distinguished from the historians of letters. Bagehot excelled in literary portraiture and Pater in finish of style. Minor critical studies, frequently reprinted from periodicals, were numberless, and a mass of refined intellectual observation was gradually accumulated by accomplished writers, of whom Myers, Minto, Hamerton, Dowden, Saintsbury, and W. M. Rossetti may be taken as types. The history of science was chiefly represented by Miss A. B. Buckley's 'Short History' (1876) and Miss Agnes Clerke's 'Astronomy of the Nineteenth Century' (1885). Professors Huxley and Tyndall are remarkable instances of natural philosophers whose masterly style has secured for their writings almost universal circulation, but they hardly fall within our scope. The science of bibliography has been greatly advanced by its Panizzis and Bradshaws, by the foundation of the Library Association, and by the example of America; and its importance becomes more generally recognised day by day. The most remarkable performance in the criticism of antiquity was Gladstone's Homer, but rather as a monument of the classical enthusiasm of a busy statesman than as a serious contribution to the study of Homeric problems. Homeric translation received its canons from Matthew Arnold's lectures (1862), and in his essay on Celtic literature (1868) the same critic gave a luminous exposition of the causes which make English poetry to differ from that of the other Teutonic races. Finally, although philology as a science is not within our province, it must be remarked that the labours of a long line of scholars have brought both comparative philology and the special study of the English language to a point vastly in advance of that which they occupied in 1837.

Criticism.

Bibliography.

Classical studies.

Philology.

Nothing like a complete view of the literary press can be attempted within our limits, but a few leading facts may be glanced at. At the Queen's accession, as already intimated,

Literary press.

a change was passing over the old quarterly review, mainly occasioned by the wider diffusion of literary curiosity and the increased intellectual pace of the age. The judgment of a quarterly on a new book had, in general, long been forestalled by the nimbler weeklies, some of which, such as the *Athenæum*, *Spectator*, and *Examiner*, enjoyed an authority fully equal to that of any review. The result was to discourage close literary criticism and to encourage essays like Macaulay's, for which the book named at the head of the article merely afforded a pretext, or collections of anecdotes strung on the thread of the nominal object of the notice. This tendency has naturally increased with the increased urgency of the circumstances that created it; and in general the object of a reviewer in one of the great quarterlies is now less the criticism of a book than the support or attack of a particular view, the exposition of some subject in which he himself is proficient, or the simple provision of entertaining reading. The weekly literary press itself is not fast enough for the demands of the age, and finds its province encroached upon by the daily papers, one or two of which have a distinctive literary character, while the others can now afford reviews from the great enlargement of their space. Competition stimulates the bad habit of reviewing from advance sheets, detrimental to conscientious criticism in more ways than one. In general, however, the tone of reviewing is immensely improved since the Queen's accession, when puffery and venality were notoriously prevalent. At present the venal journal is nearly extinct, and its praise serves to warn readers away from worthless books. The change is in great measure due to the stern integrity of the elder Dilke, the first efficient editor of the *Athenæum*; and even more to the growth of the provincial press, where literature is by no means neglected, and which renders large masses of readers inde-

Modifications in reviewing.

Improved tone of criticism.

pendent of metropolitan coteries. The question of signed articles has been much debated. In the opinion of the present writer the general adoption of such a practice would go far to destroy independence of criticism. It is probable that the staffs of most journals are too limited. It says much for the stability of English institutions that her Majesty's jubilee finds the *Edinburgh* and the *Quarterly*, which had outlived a generation before her accession, still flourishing and influential. This is probably in great measure owing to their connection with the chief political parties, for the *Westminster*, representing a less organised section of opinion, has never been established on an equally solid basis. *Blackwood*, the model of consistency in politics, is still a leading organ of opinion; while *Fraser*, long the most brilliant of magazines, has been unable to resist the competition of the shilling and sixpenny periodicals. These represent a new development which commenced with the *Cornhill* in 1859; and which, though extremely useful as a medium of wholesome and often superior literature, certainly has not tended to promote the higher criticism. *Macmillan's Magazine*, however, must be excepted from this remark. The imitation of the *Revue des Deux-Mondes* in the *Fortnightly Review* (1865) gave birth, after a considerable interval, to a new class of review, admitting all opinions indifferently to its pages, and thus providing an acceptable substitute for the pamphlet, now almost entirely out of date. Glancing at the weekly press, we find the *Athenæum* and *Spectator* flourishing with scarcely any change of the position they occupied in 1837, and see the *Saturday Review* in place of the *Atlas* and *Examiner*, while the *Academy* supplies the want which formerly existed of a weekly journal devoted to scholarship. The attempts to establish other high-class journals of a more or less literary complexion have been very numerous,

Innovations in periodical literature.

but they have been almost invariably failures, and London, at the head of the world as respects the quality of its journalism, is proportionally inferior to every continental capital as regards the quantity. The provincial newspaper press of Great Britain is by far the best in the world, and has deprived the metropolis of much of its political influence; but the periodical literature of the counties is in other respects quite insignificant. One department of journalism has been created during the present reign, the illustrated newspaper, the wide circulation of which in the colonies is an additional tie with the mother country, and which has supplied the model for similar publications throughout the world. Another most interesting development is the special correspondence which, in the hands of a Russell or a Forbes, shapes present opinion and future history. Two descriptions of periodical in vogue in 1837 have totally disappeared—'the annual,' except as a Christmas supplement to magazines, and the novel in penny weekly numbers, which has been partly absorbed into the lower periodical literature, partly driven out of the field by the extreme cheapness of reprinted novels. 'Parlour Libraries' and 'Railway Libraries' were at one period an important feature in popular literature, but the stream has become too copious to be confined with such limits.

Provincial press.

Illustrated newspapers.

Some literary undertakings of the time are sufficiently important to deserve special mention. The great 'English Dictionary' of the Philological Society, originated in a paper 'On the Deficiencies in our English Dictionaries,' read to the Society by Archbishop Trench in November 1857. The plan was fully arranged in August 1858, but the premature death of its superintendent, Herbert Coleridge, caused it to languish until 1879, when it was taken up by the Director of the Society, Dr. Murray, whose labours it may be confidently anticipated will by the end of the century

Dictionary of Philological Society.

have given the English nation a fuller and better dictionary of its native speech than is possessed by any other nation in the world. The 'Dictionary of National Biography,' commenced in 1885 under the editorship of Mr. Leslie Stephen, and of which nine volumes had been published by the end of 1886, is also an undertaking hitherto unparalleled in any other country. Although theology is necessarily excluded from our survey, it is impossible to pass over the revision of the Authorised Version of the Scriptures, the result of many years' labour by two companies of revisers, representing almost all English Protestant churches, and aided by suggestions from America. The revised New Testament was published in May 1881; the Old Testament in 1885. Shakespeare, the other great source of ideas that have become universal property, has throughout the whole of Queen Victoria's reign been the object of research and commentary that would have exhausted any other author, but have only served to show that Shakespeare cannot be exhausted.

'Dictionary of National Biography.'

Revised version of the Scriptures.

Shakespeare.

From the history of literature the transition is easy to poetry, which in the latter part of the Victorian half-century has presented several peculiar features. Foremost among them is to be noted the intense appreciation of the poetry of the past, and in one or two well-marked instances of contemporary poetry also, co-existing with a general indifference to a mass of excellent verse whose merit was fully recognised in literary circles. The music of O'Shaughnessy, the dramatic intensity of Augusta Webster and Mathilde Blind, the cultivated form of Lang, Bridges, and Gosse, the feeling of Mary Robinson and Philip Bourke Marston, the spirituality of George Macdonald and Dr. Hake, the mysticism of Roden Noel and Dora Greenwell, the versatile vigour of Buchanan, the grace of Locker and Courthope, the humour of Calverley and Austin Dobson, were recognised

Small circulation of most modern poetry.

indeed, but brought no such celebrity as might have been obtained by less meritorious efforts in other fields. Yet the age was in no way insensible to poetry. The poetry of the past, especially Wordsworth's and Shelley's, exercised a decided influence on opinion, and the living bard selected for most distinguished favour was precisely the one whom it might have been thought most difficult to appreciate.

Browning. All the peculiarities of Mr. Browning's mind and manner are combined in 'The Ring and the Book' (1868), both in length and intellectual power the most considerable poetical achievement of the age. Its intense spirit of humanity overcame all the impediments to popularity which its scale or its abstruseness might have raised; and by a long series of compositions, as repugnant to the taste he found as congenial to the taste he created, Mr. Browning has continued to subject the public to tests generally eliciting a favourable

Tennyson. response. The equally remarkable vitality of the Laureate has been exhibited less by affluence of production than by the startling energy of some detached poems. If 'Enoch Arden' (1864) merely maintained the high level from which the supplementary 'Idylls of the King' might be thought to decline, 'Lucretius' (1869) displayed a masculine dignity, 'Rizpah' (1880) a pathos, and the two 'Northern Farmers' a humour not previously manifested by the author. Yet if the master was as great as ever, the pupils were few. Edwin Arnold and Lewis Morris may be numbered among them, but, in general, young poets were manifestly influenced by a new school which might be regarded as a reaction against the Tennysonian, repudiating the latter's intimate connection with modern life, and presenting a theory of art for art's sake to which it found itself unable to adhere. Its principles and methods may almost be summed up in the statement that two of its three masters had been pre-Raphaelite painters. Dante Rossetti wrote as he painted.

aiming by the greatest possible expenditure of labour to obtain the most purely artistic result. The end justified the means. Some, not all, of his sonnets may be censured as too pictorial, and thus deficient in the grave simplicity of thought befitting the sonnet; but as a writer of ballads, some of quite epical proportion, he is absolutely unrivalled, and his lyrics either exhibit the novel effect of an Italian graft upon English literature or are entirely without pattern or precedent. The very exquisiteness of his poetry nevertheless limited the sphere of his influence on the world at large, which he had ample power to have moved if his æsthetic conscience would have permitted. The same cannot be said of William Morris ('Jason,' 1867, 'The Earthly Paradise,' 1868–70), in whom Chaucer and Keats seemed to have revived so long as he was contented to remain 'the idle singer of an empty day,' but whose recent espousal of the Socialist cause proves at least that this position is not easily tenable in an age like ours. Mr. Swinburne, the third leading member of the group, has always sought to combine æsthetic with popular aims; but the high claims of his political and philosophical poetry rest upon the swing and rush of versification, the vigour and vehemence of diction, the grand musical effect, clashing and chiming like some great cataract, far more than upon the reiteration of a few unfruitful and unoriginal ideas. Mr. Swinburne's mastery of form is especially shown in his reproductions of the spirit of the Greek drama ('Atalanta in Calydon,' 1864, 'Erechtheus,' 1876), by far the greatest achievements of the kind in our language. Poverty of ideas cannot be imputed to Christina Rossetti, but the bulk of her poetry, rich as it is in music and colour, is fitter for the cloister than the hearth. In 'Goblin Market,' however, she was able to clothe her mystic thought in an objective shape, and, while displaying all her wonted lyrical charm, to give

Pictorial school: Rossetti, Morris, Swinburne.

Christina Rossetti.

an insight into natures beyond the confines of humanity, a power also evinced in Cardinal Newman's nearly contemporary 'Dream of Ge ontius.' A more renowned authoress likewise rests her claim to poetic immortality on one masterpiece. George Eliot's 'Spanish Gypsy' (1868) is too obviously a work of reflection, and the dramatic form spoils a fine romance. But in the 'Legend of Jubal' (1870) the authoress found a subject which called all her most characteristic qualities into exercise—wisdom, large-heartedness, gentle irony, heartfelt compassion. The poetical form is also most happily chosen; the grand heroic couplet, laden but not overladen with noble thought, sweeps on with accumulating power to the most affecting of catastrophes. A more recent poem, Mr. Edwin Arnold's 'Light of Asia' (1879), though not original in form, first impressed the English mind with the moral beauty of Buddha's teaching.

George Eliot and Edwin Arnold.

Tennyson and Browning were not alone among the surviving poetical representatives of the first part of the reign. Matthew Arnold and Coventry Patmore, indeed, were far too chary of their song, but the little we received from the former was of the old quality, and the latter's 'Unknown Eros' and 'Amelia,' rich in dignified thought, notably extended the domain of English versification. Aubrey De Vere's 'Foray of Queen Meave' proved the steady progress of his powers. The Earl of Lytton's 'Orval' (1869), a remarkable work too little noticed, introduced the modern Polish school of mysticism to England; and if his 'Chronicles and Characters' (1868) too faithfully reflected Victor Hugo, the author was entirely himself in 'Fables in Song' (1874) and 'Glenaveril' (1885). 'Michael Field' and 'Ross Neil' wrote good dramas for the closet, not unapt for the stage under more auspicious circumstances. Miss Ingelow and Miss Procter reproduced some

Other remarkable poets.

of the characteristics and gained much of the popularity of Longfellow. James Thomson and Alfred Austin occupy exceptional places among the poets of the time: the former as a most powerful representative of the reckless Bohemianism and bitter revolt of an important section of the working class, the latter as the almost solitary standard-bearer of the school of Byron.

Poetical translation.

Metrical translation has been exceedingly active during the reign of Queen Victoria. The enumeration of excellent versions would be endless, but perhaps only two, executed on totally opposite principles, have become indestructibly incorporated with English literature—Rossetti's translations of the sonnets of Dante and his circle, facsimiles of the originals in form and spirit, and Fitzgerald's translation of Omar Khayyam, where the spirit remains but the letter is given to the winds. This is also the case in his version of Calderon, which, equally with McCarthy's, deserves high commendation. Munro's Lucretius, Jebb's Sophocles, Butcher and Lang's 'Odyssey,' and Lang's Theocritus, have proved the adequacy of English prose to render the highest classical poetry.

Earnestness in fiction.

If the aim at human improvement did not control the fiction of the day so completely as some other branches of literature, it was still the leading object of by far the greatest and most influential novelist. By no mind save Darwin's has the latter portion of the Queen's reign been so deeply impressed as by George Eliot's, and it is to the credit of the age that it should have consented to receive its choicest amusement from the same source as its best instruction. It is, indeed, George Eliot's chief defect to be overconscious of her mission. In no novelist of equal genius, perhaps, has the artistic element been so overpowered by the ethical, which must tell against her with a posterity occupied by other problems than hers. Her best

George Eliot.

monument will perhaps be not so much any particular work as that astonishing width of intellect which falsified all previous experience, and showed the folly of dogmatically prescribing bounds to the capacities of woman. One of her works, notwithstanding, must always be the guide of those who would know the provincial England of our day. 'Middlemarch' is Nature herself. If merit is to be judged by perfection of execution, this depressing work sets George Eliot higher than the mingled pathos and humour of 'Adam Bede' and 'The Mill on the Floss,' the dignity of 'Romola,' or the moral enthusiasm of 'Daniel Deronda.' 'Silas Marner' alone, as delightful in subject as 'Middlemarch' is the reverse, fully sustains comparison as a work of art. Next to 'Middlemarch' the future student of nineteenth-century England will derive his best material from

Anthony Trollope.

Anthony Trollope, scarcely a painter, but a matchless photographer. George Eliot exhibits the world to her reader; Trollope thrusts his reader straight into the middle of it. Unfortunately, he learned the trade of novel-writing too well, and realised Samuel Butler's ingenious fiction of the men who became the slaves of their own machines. It must be owned that the circumstances of the time were greatly against him. Never was there more temptation to rapid writing, rehashing of incident, and sensational stimulus. The three-volume system injured novels in one way, publication in magazines in another. Considering these circumstances, and the fact that novels, more than any other class of books, must depend upon the general taste, the merit of the fiction of the day is creditable both to the

Leading novelists.

writers and the age. It is impossible within our limits to enumerate the host of vivid painters of contemporary manners, in the van of which stand writers so remarkably gifted as Mrs. Oliphant and Mrs. Anne Thackeray Ritchie, William Black, Blackmore, and Besant. We can only

allude to the undiminished vitality of Disraeli ('Lothair,' 1870, 'Endymion,' 1880), and spare a few more words for two figures standing decidedly apart. Nature designed George Meredith for a great writer of serious comedy, a compeer of Congreve. The incompatibility of literary merit with dramatic success in our day drove him to the novel, which he peopled with the characters of the stage. He paints and dresses for artificial light; hence the apparent want of nature, which disappears on a fair consideration of his aim. No modern novelist demands so much intellect from his readers or gives them so much of his own. What pith and sparkle are to him, an extraordinary delicacy of observation is to Thomas Hardy, who has made more of a few square miles of Dorsetshire than many other novelists have been able to make of the great metropolis.

George Meredith.

Thomas Hardy.

Although the bent of the time was decidedly towards the novel of observation and manners, romance was not without its representatives. Wilkie Collins excelled in the contrivance of effective situations, and Charles Reade could both depict a bygone society and turn the romantic element of modern life to skilful account. Mr. Shorthouse's 'John Inglesant,' though a romance of the past, is fully in harmony with the introspective character of modern sentiment. Picturesque in description, powerful in incident, it is yet an eminently subjective book, charged with the gold and dross, the gains and illusions, of a life rich in experience. Pater's 'Marius the Epicurean' transfers modern feeling to classic ground. Mr. Clark Russell painted nautical, and H. R. Haggard African adventure. Several writers laid the theatre under contribution; 'Maxwell Gray' the pulpit; George Gissing the street; Grant Allen and James Payn everything. Meadows Taylor admirably depicted the manners of Hindustan; H. S. Cunningham, those of the Anglo-Indians. Poetical fiction is represented by Richard Jefferies

Romance

and Mathilde Blind and Oliver Madox-Brown and Frederika Macdonald; fanciful fiction by Samuel Butler and F. Anstey. R. L. Stevenson, carrying the art of thrilling with genuine, and amusing with burlesque horror beyond any contemporary novelist, has given his works the further distinction of a perfectly classical style. Olive Schreiner's 'Story of a South African Farm' is a work of extraordinary power.

Juvenile fiction.

One feature of the age must not be forgotten, the extensive employment of first-rate ability upon juvenile fiction. Few contemporary books have impressed so large and susceptible a public as 'Tom Brown's Schooldays.' Archdeacon Farrar's tales of school life come next in influence. 'Alice in Wonderland,' and its sequel, rank among the most truly original works of our day, and the achievements of Mrs. Ewing and Mrs. Molesworth are not far remote from genius. Early manhood and womanhood also had their special delineators and instructors, among whom Miss Yonge was the most influential and the most productive.

The retrospect of fifty years of Victorian literature is, in the main, encouraging and satisfactory. Few will peruse the record of beloved books and bright names in the appended chronological table without a sentiment of pride that in their days so much should have been achieved by the pen in one country, and that country their own. Almost every entry suggests some tangible gain, or at least some brilliant display of the energy of the human mind. Brilliancy is, indeed, the distinguishing characteristic of the first thirty years of the reign. During the later period historical accumulation and philosophical generalisation gain ground, and many symptoms, from the futile demand for 'a new synthesis' down to the increased attention given to bibliography, betray a conviction that knowledge requires to be clarified and systematised. We seem to be not

so much developing the existing literature as laying the foundation of a literature to come; or, to vary the metaphor, a stratum of ideas may be in process of deposit in which the growths of a new age will strike root. To forecast the nature of these growths would imply an accuracy of political and social foresight which has not been granted to man. One prediction alone seems reasonable, that the human feeling which has so largely inspired the literature of the present will continue to prevail more and more in the future. This tendency by no means implies the disappearance of works of high imagination; for it is precisely those poets of the nineteenth century whose themes are apparently the most remote from ordinary apprehension that have proved the most influential. But it undoubtedly encourages the treatment of the realities of human life; and it may be that the genius of the literary artist will for some time to come find its most attractive fields in history and biography, when the recent accumulations of material shall have been in some measure classified; and in the novel, which has escaped the doom denounced by Carlyle of banishment to the nursery, by becoming an agency of social amelioration, and which, effete in many of its departments, has in this special province enormous resources as yet untouched, and only awaiting the divination of genius to spring to light. It must be hoped that this increase in width and range may prove compatible with the wholesomeness and purity which have throughout been the appropriate characteristics of the literature of the reign of Queen Victoria.

Few write excellently without some stimulus, and the most potent impulse is commonly the hope of fame. It is natural to inquire how the Victorian era will appear in the eyes of posterity. Its reputation may possibly fall short of its desert. The great secret of its strength, its adaptation to the wants of its own day, must fail it before an

audience yet unborn. From this avenue to oblivion there is but one escape, the embodiment of thought in a perfect form. Of all literary virtues perfection of form is the most alien to our age and our race. The Englishman is by nature more solicitous about the matter than the manner of his discourse. Rightly deeming external polish an insufficient compensation for internal emptiness, he often forgets that good matter deserves good manner. The circumstances of the age, besides, are singularly unfavourable to the elaboration of classical work. Its need has been too imperious, the incentive to rapid production too alluring, the popular appreciation of style too lukewarm. The disclosure of archives, the birth of statistical science, the discovery that history must be more than a record of public transactions, have encumbered historians with precious but unwieldy material; insatiable curiosity has laid the like burden on biography; the three-volume system grafts an excrescence on almost every fiction. Few, like Tennyson and Rossetti, have polished more diligently than they have written; or, like Darwin, have deposited the germ of a library in a book. Diffuseness is the reigning literary vice. Never has plausible prophecy been more signally falsified than the prediction, uttered early in the century, that ere long no writer would be read who could not do for language what the cotton-press did for cotton, compress a page into a sentence. Whether this prediction is ever fulfilled or not, it is certain that posterity will have too many urgent problems and too many insistent writers of its own to spare much time for its predecessors, save those who can serve it as models, and it may well be that its interest in a diffuse and unsymmetrical literature will be mainly historical. The Victorian era is far too important a link in the chain of human development to be dropped, and its historian will not lament a lack of material. Its literature is remarkably

copious, and remarkably sincere. From none can a more accurate report be obtained how men lived and, more important, how they felt and thought. Apart from this species of posthumous vitality, in no way to be disdained, it may be the destiny of our leading minds to live mainly in the direction which, by moulding their own generation, they have given to the generations to come. They may fulfil as well as partake the aspiration of one of the greatest among them for the fellowship of a 'choir invisible'—

> Breathing as beauteous order that controls
> With growing sway the growing life of man.

R. GARNETT.

CHRONOLOGICAL TABLE.

It is impossible within our limits to make the least approach to a complete catalogue of interesting or remarkable books and literary events during the reign of her Majesty. All that can be done is to record those which have most noticeably contributed to the intellectual development of the age, or expressed its leading tendencies. An exception must be made in favour of some works of imagination which cannot, perhaps, be strictly said to have done either, but which it would be impossible to overlook. Scientific works can only be mentioned when treating of subjects connected with the general culture of the time, and many of the highest technical importance have necessarily remained unnoticed. The same remark applies to the great mass of meritorious histories, biographies, and works of travel, those only being mentioned which made a very distinct addition to knowledge or powerfully impressed the public mind. The latter is the only admissible criterion in the case of philosophical and speculative literature. Legal and theological books have been introduced only when absolutely classical or of great historical interest. The minor works even of writers of distinguished genius have been omitted. In the case of living novelists, but few of whom it has been possible to include, the first book has been recorded, or in some instances the most celebrated or typical of the author's work. Translations have only been entered when supplying the absence of any English work of equal authority, or when entirely naturalised, or brought out simultaneously on the Continent and in England. The date of the first edition has been given as that of publication, except in a very few instances when the book has been practically rewritten. In the case of books published at considerable intervals, the date of the first volume has alone been given, with an occasional exception in favour of works of special importance; but the date of completion has usually been preferred when books have been published in monthly parts. Great care has been taken to record republications in collected editions, indicating that an author has obtained a permanent place in literature; reprints from reviews, however, have not been inserted unless the writer has acquired celebrity by other publications. False dates have been rectified as far as possible.

1837

Carlyle's French Revolution published
Lockhart's Life of Scott published
Southey's Works collected
Carlyle lectures on German Literature
Hallam, Introd. to Lit. of Europe
Kemble translates Beowulf
Pictorial Hist. of England commenced
Brougham, Statesmen in Time of George III.
Wilkinson, Ancient Egyptians
Nichol, Architecture of the Heavens
H. *Martineau*, Society in America
Pickwick completed
Landor, Pentameron
Browning, Strafford

1838

Record Office reconstructed
Camden Society established
Carlyle lectures on Hist. of Literature
Bentham's Works collected
Sartor Resartus first pub. in England
Lane translates Arabian Nights
Milman edits Gibbon
Gladstone, Church and State
Arnold, History of Rome
Merle d'Aubigné's History of the Reformation first translated
Lyell, Elements of Geology
Porter, Progress of the Nation
Oliver Twist
Death of L. E. Landon, Oct. 15

1839

Journal of Statistical Soc. commenced
Darwin investigates Origin of Species
Carlyle lectures on the Revolutions of Europe
Carlyle's Essays collected
Shelley's Poetical Works collected
Blake's Poems edited by Wilkinson
Sydney Smith's Essays collected
Voyage of 'Adventure' and 'Beagle'
Murchison, Silurian System
Kemble, Codex Diplomaticus Ævi Saxonici
Forster, Statesmen of the Commonwealth
Donaldson, New Cratylus
Lewis, On the Romance Languages
Nicholas Nickleby
Bailey's Festus
Bradshaw's Railway Guide commenced

1840

Parker Society founded
Carlyle lectures on Hero-Worship
Mill retires from *Westminster Review*
Shelley's Prose Works collected
Ranke's History of the Popes translated
Coleridge, Confessions of an Inquiring Spirit
Whewell, Phil. of the Induct. Sciences
Milman, History of Christianity to Theodosius
Strickland, Lives of the Qns. of Engl.
Dickens, Master Humphrey's Clock
Browning, Sordello
Death of Madame d'Arblay, Jan. 6

1841

Shakespeare Society established
Tauchnitz's Engl. Reprints commenced
Tracts for the Times discontinued
Punch founded
Keats's Poems collected
Emerson's Essays first pub. in Engl.
Moxon prosecuted for publishing Queen Mab
Mill corresponds with Comte
Carlyle's Hero-Worship published
Latham, English Language
Isaac Disraeli, Amenities of Literature
Borrow, Gipsies in Spain
Browning, Bells and Pomegranates, No. 1
Deaths of—
Thomas Barnes, editor of *Times*, May 7
Blanco White, May 24
Theodore Hook, Aug. 24

1842

Copyright Act passed
Philological Society founded
Darwin, On Coral Reefs
Brougham, Political Philosophy
Alison's History of Europe completed
Madame d'Arblay, Diary
Wordsworth, Early and Late Poems
Tennyson, Poems, chiefly Lyrical
Macaulay, Lays of Ancient Rome
Herbert Spencer first writes
Deaths of—
Sir Charles Bell, April 28
Dr. Arnold, June 12
W. Maginn, Aug. 20

1843

Wordsworth Poet Laureate
Ray Society founded
Penny Cyclopædia completed
Macaulay's Essays collected
Liddell and Scott, Greek Lexicon
Mill, Logic
Carlyle, Past and Present
Ruskin, Modern Painters
Borrow, Bible in Spain
Dickens, Christmas Carol
R. H. Horne, Orion
Deaths of—
Southey, March 21
John Allen, April 3
John Murray, June 27
John Foster, Oct. 15

1844

Vestiges of Creation
Smith, Dict. of Classical Biography
Jeffrey's Essays collected
Wellington's Despatches published
Nelson's Despatches published
Lord Hervey's Memoirs, ed. by Croker
Lives of the English Saints
Stanley, Life of Arnold
May, Treatise on the Law of Parliament
Horne, New Spirit of the Age
Kinglake, Eothen
Disraeli, Coningsby
Dickens, Martin Chuzzlewit
Elizabeth Barrett, Poems
Barnes's first rural poetry
Deaths of—
Beckford, May 2
Campbell, June 15
Cary, Aug. 14
Sterling, Sept. 18

1845

Encyclopædia Metropolitana compl.
Penny Magazine discontinued
Southey's Poetical Remains published
Clinton, Fasti Romani
Carlyle, Oliver Cromwell's Letters and Speeches
Campbell, Lives of the Chancellors
Brougham, Men of Letters and Science
Lewes, Biographical History of Philosophy
M'Culloch, Literature of Pol. Economy
Bopp's Comparative Grammar trans.
Jameson, Memoirs of the Early Italian Painters
Ford, Handbook of Spain
Darwin, Voyage of a Naturalist
Disraeli, Sybil
Deaths of—
Sydney Smith, Feb. 22
Hood, May 3
Barham, June 17

1846

International Copyright enacted
Useful Knowledge Society founded
Hakluyt Society founded
Sir H. Rawlinson deciphers cuneiform inscriptions
De Morgan's first researches in logic
Reid edited by Sir William Hamilton
Grenville Library bequeathed to the nation
Foreign Quarterly Review discont.
Dickens edits *Daily News*
Landor's Works collected
Last number of Bells and Pomegranates
Grote, History of Greece
Burton, Life of David Hume

Humboldt's Cosmos trans. by Sabine
Ulrici, The Art of Shakespeare, trans.
First number of Vanity Fair
Death of John Hookham Frere, Jan. 7

1847

Bohn's Libraries commenced
Emerson lectures in England
Thirlwall's Hist. of Greece completed
Layamon's Brut ed. by Sir F. Madden
Boole, Mathematical Analysis of Logic
Friends in Council
C. Brontë, Jane Eyre
E. Brontë, Wuthering Heights
Mrs. Linton's first novel
Landor, Hellenics
Tennyson, Princess
Deaths of—
Sharon Turner, Feb. 13
Chalmers, May 31
John Walter, chief proprietor of *Times*, July 28

1848

Professor Max Müller settles at Oxford
Macaulay, History, vols. i. and ii.
Layard, Nineveh
Smith, Dictionary of Greek and Roman Antiquities
Weld, History of Royal Society
Mill, Political Economy
Foss, Judges of England
Lord Houghton, Life of Keats
H. Martineau, Eastern Life
Dickens, Dombey and Son
Bulwer, The Caxtons
Mrs. Gaskell, Mary Barton
Deaths of—
Isaac Disraeli, Jan. 19
Sir H. Nicolas, Aug. 3
Captain Marryat, Aug. 9

1849

Commission of Inquiry into British Museum
Browning's Poems first collected
H. Martineau, History of the Thirty Years' Peace
Campbell, Lives of the Chief Justices
Green, Lives of the Princesses of Engl.
Disraeli, Life of Lord George Bentinck
Stephen, Essays in Eccles. Biography
Southey, Life and Correspondence
Wakefield, Art of Colonisation
M'Culloch, Political Economy
Lewis, Influence of Authority in Matters of Opinion
Mabinogion trans. by Lady C. Guest
Brontë, Shirley
Miss Mulock's first novel
Arnold, Poems by 'A.'
Deaths of—
Hartley Coleridge, Jan. 6
T. L. Beddoes, Jan. 20
Maria Edgeworth, June 21
Ebenezer Elliott, Dec. 1

1850

'Evolution' first used in a philosophical sense
Tennyson Poet Laureate
Free Libraries Act passed
Notes and Queries established
Household Words established
Wickliffe's Bible edited by Forshall and Madden
Merivale, History of Roman Empire
Mure, History of Greek Literature
Spencer, Social Statics
Leigh Hunt, Autobiography
Dickens, David Copperfield
Thackeray, Pendennis
Kingsley, Alton Locke
Wordsworth, Prelude
Tennyson, In Memoriam
Browning, Christmas Eve and Easter Day
Deaths of—
Jeffrey, Jan. 26
Wordsworth, April 23

1851

Fees abolished in Record Office
Beddoes's Poems collected

Palgrave, Hist. of Engl. and Normandy
Stephen, Lectures on Hist. of France
Kaye, Hist. of the War in Afghanistan
Carlyle, Life of Sterling
Bailey, Theory of Reasoning
Wilkinson, Human Body in Relation to Man
Ruskin, Stones of Venice
Mrs. Jameson, Legends of the Madonna
Borrow, Lavengro
Mrs. Browning, Casa Guidi Windows
Deaths of—
Mrs. Shelley, Feb. 1
Joanna Baillie, Feb. 23

1852

Differences between Publishers and Booksellers adjusted
Westminster Review, new series
Bulwer's Poems collected
Thackeray, Esmond
Tennyson, Ode on Death of Duke of Wellington
Arnold, Empedocles on Etna
Deaths of—
Moore, March 25
Sara Coleridge, May 3

1853

Comte's Positive Philosophy condensed by Miss Martineau
De Quincey's Works collected
Whewell, Plurality of Worlds
Layard, Discoveries in Nineveh and Babylon
Wallace, Travels on the Amazon
Haydon, Autobiography
Moore, Diaries and Correspondence
Dickens, Bleak House
Bulwer, My Novel
C. Brontë, Villette
Kingsley, Hypatia
Mrs. Gaskell, Ruth
Mrs. Gaskell, Cranford
Reade, Christie Johnstone
Miss Yonge, Heir of Redclyffe
Landor, Last Fruit off an Old Tree
Arnold, Poems
Deaths of—
F. W. Robertson, Aug. 15
Mrs. Opie, Dec. 2

1854

Philobiblon Society established
Eighth ed. of Encyclopædia Britannica
Smith, Dict. of Classical Geography
Bunsen, Christianity and Mankind
Milman, Hist. of Latin Christianity
Boole, Laws of Thought
Patmore, Angel in the House
Deaths of—
Talfourd, March 13
Professor Wilson, April 3
James Montgomery, April 30
Lockhart, Nov. 25

1855

Thackeray's Miscellanies collected
Oxford and Cambridge Essays commenced
National Review founded
Macaulay, History of England, vols. iii. and iv.
Lewis, Credibility of Early Roman History
Grote's History of Greece completed
Helps, Spanish Conquest of America
Spencer, Principles of Psychology
Bain, The Senses and the Intellect
Burton, Pilgrimage to Mecca and Medina
Lewes, Life of Goethe
Thackeray, The Newcomes
Kingsley, Westward Ho
Trollope, The Warden
Tennyson, Maud
Browning, Men and Women
Deaths of—
Miss Mitford, Jan. 10
Archdeacon Hare, Jan. 23
Charlotte Brontë, March 31
Samuel Rogers, Dec. 18

1856

First Edition of Men of the Time
Saturday Review established
Mrs. Browning's Poems collected
Brougham's Contributions to *Edinburgh Review* collected
Masson's Essays collected
Southey's Correspond. ed. by Warter
Froude, History of England from Wolsey to Elizabeth
Stanley, Sinai and Palestine
Deaths of—
Sir W. Hamilton, May 6
Hugh Miller, Dec. 23.

1857

New Reading-room at British Museum
Carlyle's Works collected
Spedding's Edition of Bacon commnced
Walpole's Letters edited by Peter Cunningham
Finlay, Greece under Foreign Dominion
Livingstone, Missionary Travels
George Eliot, Scenes of Clerical Life
Dickens, Little Dorrit
Kingsley, Two Years Ago
Reade, It is Never Too Late to Mend
John Halifax, Gentleman
Tom Brown's Schooldays
Deaths of—
John Mitchell Kemble, March 26
Douglas Jerrold, June 8
John Wilson Croker, Aug. 10

1858

Dickens's Works collected
Carlyle, Frederick the Great
English Dictionary projected by Philological Society
State Paper Office opened to the public
Chronicles and Memorials of English History commenced
Calendars of State Papers commenced
Prof. Rawlinson translates Herodotus
Buckle, Hist. of Civilisation in England
Bain, The Emotions and the Will
Muir, Life of Mahomet
Masson, Life of Milton
W. Morris, Defence of Guenevere
Deaths of—
George Combe, Aug. 14
Richard Ford, Sept. 1

1859

Darwin, Origin of Species
Mill's Essays collected
Collected edition of Bulwer's Novels
Cornhill Magazine commenced
Macmillan's Magazine commenced
Mill, On Liberty
Masson, Life of Milton
Edwards, Memoirs of Libraries
Müller's Hist. of Greek Literature translated
Tennent, Ceylon
George Eliot, Adam Bede
Thackeray, Virginians
George Meredith, Ordeal of Richard Feverel
Tennyson, Idylls of the King
Fitzgerald, Trans. of Omar Khayyam
Deaths of—
Hallam, Jan. 21
Lardner, April 29
Leigh Hunt, Aug. 28
Sir James Stephen, Sept. 12
De Quincey, Dec. 8
John Austin, Dec. 17
Macaulay, Dec. 28

1860

English Cyclopædia
Essays and Reviews
Good Words commenced
Hook, Lives of the Abps. of Canterbury
Mill, On Representative Government
Tyndall, Glaciers of the Alps
George Eliot, Mill on the Floss
Wilkie Collins, Woman in White
Patmore, Faithful for Ever
Deaths of—
Sir W. P. Napier, Feb. 12
Mrs. Jameson, March 19

Prof. H. H. Wilson, May 8
G. P. R. James, May 9
Ebenezer Jones, Sept. 14
Dr. Croly, Nov. 24
Bunsen, Nov. 28

1861

Domesday Book facsimiled by Sir H. James
Arnold's Essays collected
Macaulay, History, vol. v.
May, Constitutional Hist. of England
Maine, Ancient Law
Max Müller, Lectures on Science of Language
Stanley, Eastern Church
Mill, Utilitarianism
Lewes, Aristotle
Smiles, Lives of the Engineers
M. Arnold, On Translating Homer
Rossetti, Early Italian Poets
Palgrave, Golden Treasury
George Eliot, Silas Marner
Dickens, Great Expectations
Reade, The Cloister and the Hearth
Deaths of—
J. W. Donaldson, Feb. 10
Mrs. Browning, June 29
Sir F. Palgrave, July 6
A. H. Clough, Nov. 13

1862

The Prince Consort's Speeches collctd
Spencer, First Principles
Colenso, Pentateuch Critically Examd.
Darwin, Fertilisation of Orchids
Newton, History of Discoveries at Halicarnassus
Professor Rawlinson, The Great Ancient Monarchies
Hardy, Materials of English History
Hunter, Rural Bengal
Thackeray, Philip
Braddon, Lady Audley's Secret
Mrs. Browning, Last Poems
Christina Rossetti, Goblin Market
Deaths of—
Edward Gibbon Wakefield, May 16
H. T. Buckle, May 29
Sheridan Knowles, Dec. 1

1863

Smith, Dictionary of the Bible
Sir Henry Taylor's Poetical Works collected
Lyell, Antiquity of Man
Huxley, Man's Place in Nature
Speke and Grant, Discovery of Sources of Nile
Bates, Amazons
Kinglake, Invasion of the Crimea
Freeman, Hist. of Federal Government
Gardiner begins History of James I.
Gilchrist, Life of Blake
Gervinus on Shakespeare translated
George Eliot, Romola
Miss Thackeray, Story of Elizabeth
Mrs. Oliphant, Chronicles of Carlingford
George Macdonald, David Elginbrod
Deaths of—
Sir George C. Lewis, April 13
Archbishop Whately, Oct. 8
Thackeray, Dec. 24

1864

Early English Text Society founded
Shakespeare Tercentenary
National Review discontinued
Statesman's Year-Book commenced
Henry Morley, English Writers before Chaucer
Kaye, History of the Sepoy Mutiny
Newman, Apologia
Crowe and Cavalcaselle, History of Painting in Italy
Jameson, History of our Lord in Works of Art
Munro's translation of Lucretius
Tennyson, Enoch Arden
Swinburne, Atalanta in Calydon
Deaths of—
W. J. Fox, June 3
Nassau W. Senior, June 4
Professor Ferrier, July 10
C. W. Dilke, Aug. 10

Landor, Sept. 17
M'Culloch, Nov. 11

1865

Fortnightly Review commenced
Seeley, Ecce Homo
Carlyle's Frederick completed
Grote, Plato
Mill, On Hamilton
Mill, On Comte
Green, Spiritual Philosophy (Coleridge)
Stirling, Secret of Hegel
Lecky, History of Rationalism
Tylor, Early History of Mankind
Lubbock, Prehistoric Times
Long, Decline of the Roman Republic
Palgrave, Travels in Arabia
Leslie and Taylor, Life of Sir Joshua Reynolds
Fergusson, History of Architecture
Browning, Dramatis Personæ
Swinburne, Chastelard
Lewis Carroll, Alice in Wonderland
Deaths of—
Isaac Taylor the elder, June 28
W. E. Aytoun, Aug. 4
Sir W. R. Hamilton, Sept. 2
Mrs. Gaskell, Nov. 12

1866

Carlyle delivers Inaugural Discourse at Edinburgh
Clarendon Press Series commenced
Collier's Reprints commenced
Contemporary Review commenced
Duke of Argyll, Reign of Law
Baker, Albert Nyanza
George Eliot, Felix Holt
Swinburne, Poems and Ballads
Deaths of—
T. L. Peacock, Jan. 23
Whewell, March 6
Keble, March 29
G. L. Craik, June 25

1867

Mill delivers Inaugural Address at St. Andrew's
Publication of Scottish Records undertaken
Tourgueneff first translated into Engl.
Freeman, Hist. of the Norman Conq.
Burton, History of Scotland
Stoughton, Eccles. Hist. of England
Roberts and Donaldson, Ante-Nicene Fathers
Pattison, Suggestions on Academical Organisation
Müller, Chips from a German Workshop
Arnold, Celtic Literature
Deutsch, Essay on Talmud in *Quarterly Review*
Darwin, Fertilisation of Orchids
Morris, Jason
Deaths of—
Sir A. Alison, March 25
Sarah Austin, Aug. 8

1868

The Queen, Leaves from a Journal of our Life in the Highlands
Robert Browning's Poetical Works collected
Clough's Works collected
Arber's English Reprints commenced
Darwin, Variation of Plants and Animals
Dilke, Greater Britain
Milman, Annals of St. Paul's
Stanley, Westminster Abbey
Browning, The Ring and the Book
George Eliot, The Spanish Gypsy
Morris, The Earthly Paradise
Cardinal Newman, Poems
Owen Meredith, Chronicles and Characters
Deaths of—
Sir D. Brewster, Feb. 10
Lord Brougham, May 7
Dean Milman, Sept. 24

1869

Historical Manuscripts Commission instituted
Palestine Exploration Fund instituted

Harleian Society founded
Publication of *Academy* commenced
Publication of *Nature* commenced
Arnold's Poetical Works collected
Froude's Essays collected
Defoe's unpublished Works ed. by Lee
Gladstone, Juventus Mundi
Lecky, History of European Morals
Mill, Subjection of Woman
Arnold, Culture and Anarchy
Masson, Recent British Philosophy
Manning, Ancient India
Wallace, Malay Archipelago
Crabb Robinson, Diary
Blackmore, Lorna Doone
Deaths of—
Sir H. Ellis, Jan. 15
W. Carleton, Jan. 30
Sir Emerson Tennent, March 6

1870

Ancient Classics for English Readers commenced
Disraeli's Novels collected
Lubbock, Origin of Civilisation
Huxley, Lay Sermons
Newman, Grammar of Assent
Arnold, St. Paul
Galton, Hereditary Genius
Lord Dalling, Life of Palmerston
Disraeli, Lothair
Rossetti, Poems
Deaths of—
Rev. A. Dyce, May 15
Mark Lemon, first editor of *Punch*, May 23
Dickens, June 29
Professor Conington, Oct. 23

1871

Anthropological Institute established
Historical Society founded
English Dialect Society founded
Ruskin's Works partially collected
Elwin and Courthope's edition of Pope
Jowett translates Plato
Berkeley's Works edited by Fraser
Darwin, Descent of Man
Wallace, Contributions to Theory of Natural Selection
Tylor, Primitive Culture
Maine, Village Communities
Tyndall, Fragments of Science
Ruskin, Fors Clavigera
Forster, Life and Times of Dickens
Black, A Daughter of Heth
Besant and Rice, Ready Money Mortiboy
Browning, Balaustion's Adventure
Swinburne, Songs before Sunrise
Deaths of—
Robert Chambers, March 17
De Morgan, March 18
Sir J. Herschel, May 11
Grote, June 18
Dean Mansel, July 30
Babbage, Oct. 18

1872

Society of Biblical Archæology founded
International Scientific Series commcd
Tennyson's Works collected
Monier Williams, Sanscrit Dictionary
Grote, On Aristotle
Freeman, Growth of the English Constitution
Froude, English in Ireland
Stanley, How I Found Livingstone
Memoirs of Baron Stockmar
Morley, Voltaire
Arnold, Literature and Dogma
George Eliot, Middlemarch
S. Butler, Erewhon
Deaths of—
H. F. Chorley, Feb. 15
F. D. Maurice, April 1
Charles Lever, June 1
Albany Fonblanque, Oct. 13
Sir John Bowring, Nov. 23

1873

Palæographical Society founded
Records of the Past commenced
Mill, Autobiography
Spencer, Descriptive Sociology

Greg, Enigmas of Life
Stephen, Liberty, Equality, Fraternity
Bryce, Holy Roman Empire
Pater, Studies in the History of the Renaissance
Morley, Rousseau
Bulwer, Parisians
Deaths of—
Bulwer, Jan. 18
Sedgwick, Jan. 27
Sir F. Madden, March 8
Charles Knight, March 9
John Stuart Mill, May 8

1874

Martin, Life of the Prince Consort
New Shakspere Society founded
Milton edited by Masson
Mill, Essays on Nature and Theism
Farrar, Life of Christ
Sidgwick, Methods of Ethics
Lewes, Problems of Life and Mind
Jevons, Principles of Science
Cairnes, Political Economy
Stubbs, Constitutional Hist. of Engl.
J. R. Green, Short History of England
Greville Memoirs
Livingstone, Last Journals
Swinburne, Bothwell
Lytton, Fables in Song
Hardy, Far from the Madding Crowd
Deaths of—
Herman Merivale, Feb. 8
Agnes Strickland, July 13
Sydney Dobell, Aug. 22
B. W. Procter, Oct. 4

1875

Ninth edition of Encyclopædia Britannica commenced
Comte's Positive Polity translated
Wordsworth's Prose Works collected
Peacock's Works collected
Dobell's Works collected
Arber edits Registers of Stationers' Co.
Pepys' Diary edited by Bright
Maine, Early Institutions
Holyoake, History of Co-operation in England
Symonds, Renaissance in Italy
Pattison, Life of Casaubon
A. W. Ward, History of English Dramatic Literature
Dowden, Shakespeare, his Mind and Art
Deaths of—
Kingsley, Jan. 23
Finlay, Jan. 26
Sir C. Lyell, Feb. 22
Sir A. Helps, March 7
Professor Cairnes, July 8
Sir F. B. Head, July 20
Bishop Thirlwall, July 27
Lord Stanhope, Dec. 24

1876

Gladstone, Homeric Synchronism
Lord Houghton's Poems collected
Forman edits Shelley
Spencer, Principles of Sociology
Essays on Endowment of Research
Wallace, Geographical Distribution of Animals
Stephen, History of English Thought in the Eighteenth Century
Skene, Celtic Scotland
Trevelyan, Life of Macaulay
George Eliot, Daniel Deronda
Swinburne, Erechtheus
Deaths of—
John Forster, Feb. 1
Harriet Martineau, June 27
Sir J. W. Kaye, July 24
E. W. Lane, Aug. 10

1877

Library Association founded
Publication of *Nineteenth Century* commenced
Smith and Wace, Dictionary of Christian Biography
Thomas, International Numismata Orientalia
Green, History of English People
May, Democracy in Europe

Huxley, Physiography
Butler, Life and Habit
Mackenzie Wallace, Russia
Schliemann, Mycenæ
Müller, History of Sanscrit Literature
Blades, Biography of Caxton
Autobiography of Harriet Martineau
Morris, Sigurd the Volsung
Patmore, Unknown Eros
Deaths of—
John Oxenford, Feb. 21
Walter Bagehot, March 24
Mrs. Norton, June 15

1878

Folk Lore Society established
Index Society established
Hibbert Lecture instituted
English and Foreign Philosophical Library commenced
English Men of Letters Series comnced
Walpole, Hist. of England since 1815
Morley, Diderot and the Encyclopædists
Patmore, Amelia
Deaths of—
Sir T. D. Hardy, June 15
G. H. Lewes, Nov. 30

1879

Sacred Books of the East series comnced
Hellenic Society founded
Grove, Dictionary of Music
Dr. Murray undertakes Philological Society's Dictionary
W. K. Clifford's Essays collected
Patmore's Poetical Works collected
Barnes's Poems collected
Farrar, Life of St. Paul
Froude, Life of Cæsar
Seeley, Life of Stein
McCarthy, History of our Own Times
Escott, England
Spencer, Data of Ethics
Pattison (Mrs.), Renaissance of Art in France
Browning, Dramatic Idyls
Arnold, Light of Asia
Deaths of—
C. Appleton, editor of *Academy*, Feb. 1
J. S. Brewer, Feb. 16
C. J. Wells, Feb. 17
W. Howitt, March 3
W. K. Clifford, March 4
Sir A. Panizzi, April 8
George Long, Aug. 10
J. T. Delane, editor of the *Times*, Nov. 22

1880

Gladstone's Essays collected
Schliemann, Ilios
Hodgkin, Italy and her Invaders
Fyffe, History of Modern Europe since 1815
Duffy, Young Ireland
Report on the Voyage of the 'Challenger'
Wallace, Island Life
Pollock, Spinoza
Newton, Essays on Art and Archæology
Murray, History of Greek Sculpture
Lord Beaconsfield, Endymion
T. H. Ward, English Poets
Tennyson, Ballads
Thomson, City of Dreadful Night
Deaths of—
Planché, May 29
Tom Taylor, July 12
George Eliot, Dec. 22

1881

Revised Version of New Testament pub.
Printed Catalogue of British Museum Library undertaken
Catalogue of Ancient MSS. in British Museum
Anecdota Oxoniensia commenced
Tauchnitz Series attains the two-thousandth volume
Imperial Gazetteer of India
Jowett translates Thucydides
Carlyle's Reminiscences
Freeman, Hist. Geography of Europe
Green, The Making of England

Trevelyan, Life of Fox
Morley, Life of Cobden
Lyell, Life of Sir Charles Lyell
Huxley, Science and Culture
Tylor, Anthropology
Shorthouse, John Inglesant
Jefferies, Wood Magic
Rossetti, Ballads and Sonnets
Swinburne, Mary Stuart
Deaths of—
Carlyle, Feb. 5
Lord Beaconsfield, April 19
Dean Stanley, July 18
George Borrow, July 30
John Hill Burton, Aug. 10
E. J. Trelawney, Aug. 13
W. R. Greg, Nov. 15

1882

Fraser's Magazine discontinued
Longman's Magazine established
Payne translates Arabian Nights
Saintsbury edits Dryden
Knight edits Wordsworth
John Morley edits Emerson
Creighton, History of the Papacy
Seeley, Natural Religion
Darwin, On Earthworms
Freeman, Reign of William Rufus
Halliwell, Outlines of Life of Shakespeare
Froude, Life of Carlyle
Martineau, Spinoza
Bain, Lives of James and J. S. Mill
Stevenson, New Arabian Nights
Anstey, Vice-Versâ
Deaths of—
T. H. Green, March 26
D. G. Rossetti, April 9
Darwin, April 19
James Thomson, June 3
Prof. Balfour, July 19
Jevons, Aug. 13

1883

Clark Lectureship founded
Schliemann, Troja
Isaac Taylor, The Alphabet
Birch, Cartularium Saxonicum
Gardiner, History of England under James I. and Charles I.
J. R. Green, Conquest of England
Lecky, Hist. of England in 18th Cent.
Rusden, History of Australia
Rusden, History of New Zealand
Seeley, Expansion of England
Life of Lord Lytton, by the Earl of Lytton
Letters of Jane Welsh Carlyle
Deaths of—
J. R. Green, March 7
William Chambers, May 20
E. Fitzgerald, June 14
J. P. Collier, Sept. 17

1884

Tennyson raised to the Peerage
English Dictionary of the Philological Society, edited by Dr. Murray
Professorship of Classical Archæology at Oxford
Forman edits Keats
Sir Alexander Grant, History of University of Edinburgh
Brewer, Reign of Henry VIII.
Croker, Correspondence and Diaries
Froude, Life of Carlyle in London
Ruskin, Præterita
Deaths of—
A. Hayward, Feb. 2
T. Chenery, editor of the *Times*, Feb. 2
R. H. Horne, March 13
Mark Pattison, July 30
Sir Alexander Grant, Bart., Nov. 30

1885

Revised Version of the Old Testament
Dict. of National Biography comnd.
Professorship of English Language and Literature at Oxford
Bullen edits the Early Engl. Dramatists
Burton translates Arabian Nights
Schliemann, Tiryns

Gordon, Journals at Khartoum
Cross, Life of George Eliot
Memoirs of Mark Pattison
Maine, Popular Government
Martineau, Types of Ethical Theory
T. H. Green, Philosophical Works
Beddoe, Races of Great Britain
Ball, Story of the Heavens
Clerke, History of Astronomy of the Nineteenth Century
Tennyson, Tiresias
Earl of Lytton, Glenaveril
Pater, Marius the Epicurean
Deaths of—
H. A. J. Munro, March 30
Lord Houghton, Aug. 11

1886

English Historical Review founded
Asiatic Quarterly Review founded
Cassell's National Library commenced
Rossetti's Works collected
Tennyson, Locksley Hall Sixty Years After
Gardiner, Hist. of the Great Civil War
Seeley, Short History of Napoleon
Stubbs, Historical Essays
Cruise of the 'Bacchante'
Froude, Oceana
Dowden, Life of Shelley
Harrison, Choice of Books
Deaths of—
James Fergusson, Jan. 9
H. Bradshaw, Feb. 10
Sir Henry Taylor, March 27
Archbishop Trench, March 28
Lord Farnborough (Sir T. E. May), May 17
Sir Samuel Ferguson, Aug. 15

A NOTE ON THE NEWSPAPER PRESS.

FEW, if any, institutions have developed with greater rapidity under our Queen's reign than the newspaper press, and one of the greatest impulses which it has received from any legislative act nearly coincides with the date of her accession. In 1836 the stamp on newspapers was reduced from fourpence to a penny. Within the year intervening between this measure and her Majesty's accession, 61 new papers were established and 8,000,000 additional stamps used, a sufficient augury of the extended influence to which journalism was destined. Even then it was a giant, whose greatness the deepest minds were foremost to appreciate. 'There is no Church, sayest thou?' speaks, or rather (for lack of a publisher) soliloquises, Carlyle in 1831. 'The voice of Prophecy has gone dumb? This is even what I dispute; but in any case, hast thou not still Preaching enough? A Preaching Friar settles himself in every village: and builds a pulpit, which he calls Newspaper. Therefrom he preaches what most momentous doctrine is in him: and dost not thou listen, and believe?' While Carlyle was thus writing, Lord Lyndhurst was saying to Greville: 'Why, Barnes' (then editor of the *Times*) 'is the most powerful man in the country!' The highest intellects, the most eminent public men, had worked for the press. Coleridge had at one time guided the *Morning Post*; at a later period he had pleaded for the oppressed factory children in many leaders. Leigh Hunt and De Quincey had edited newspapers for several years. Brougham's connection with the press was so notorious that he was caricatured scribbling newspaper articles in furious haste at two o'clock in the morning. The effects of giving a wider audience to so much power could not but be momentous.

Perhaps the best idea of the press as it existed shortly before

the Queen's accession may be derived from three articles in the *Westminster Review* (Nos. 3, 19, 23). From these we learn that, in 1829, 308 newspapers were published in the United Kingdom, of which 55 appeared in London, 37 in Scotland, and 59 in Ireland. Thirteen of the London papers were dailies, with a united circulation of 40,000 copies, or less than one-sixth of the present circulation of the *Standard*. One-fourth of these copies were circulated by the *Times*. They had 900 advertisements among them. The improved printing-machines printed 2,800 copies within the hour, which was thought miraculous. A hand-machine for an evening paper cost 600 guineas. Parliamentary reports were seldom taken in shorthand, 'from the impossibility of finding room for all that a member says.' There were, of course, no daily papers out of the metropolis. The first newspaper printing-machine had just been imported into Scotland. Edinburgh was rich in good newspapers; but 'the Irish press may be said to reflect the real condition of the country, full of politics, and almost destitute of capital and commercial enterprise.' The circulation of the Dublin press was but little larger than twenty years before, and the advertisements had fallen off one-half. On the whole, taking the press of the United Kingdom all round, the Reviewer could certify that 'its tendencies were *for* good, and *to* good, and its influence undoubtedly on the side of truth, prudence, and virtue.' The mitigation of the oppressive taxes on newspapers was vigorously advocated by the *Westminster*, and the agitation bore fruit, as we have seen, in the reduction of the stamp duty in 1836. In 1832, the advertisement duty had been reduced from 3*s*. 6*d*. to 1*s*. 6*d*., and within six years the number of advertisements rose from 783,000 to 1,315,000. As the reduction of charge to advertisers strictly corresponded to the reduction of taxation, the revenues of newspaper proprietors from this source were nearly doubled.

In 1839, London had 94 papers—7 morning, 5 evening, 82 weekly and miscellaneous; 256 were published in the provinces, including Wales, the Isle of Man, and the Channel Islands; 59 in Scotland; and 70 in Ireland. The *Times* circulated 1,090,000 copies during the three months of April, May, and June—more than twice as many as any other paper. The *Chronicle* was next, with 530,000 copies. Four provincial papers circulated more than 100,000 copies during the time: the *Man-*

chester Guardian (semi-weekly), the *Leeds Mercury*, *Stamford Mercury*, and *Northern Star*, which, as a Chartist organ, had readers in every part of the country. It should be added that these statistics were not always strictly trustworthy, it being a not uncommon trick of struggling newspapers to order a large number of stamps just before they expected the return to be published, that their circulation might for the time appear larger than it really was.

In the last quarter of 1843, London has 13 daily and 104 weekly papers. There are 235 provincial (a falling off since 1839), 70 Scotch, and 72 Irish. The circulation of the *Times* has risen to 1,550,000 copies for the three months, and its nearest competitor, the *Herald*, only issues 412,000. The circulation of every daily paper, morning or evening, but the *Times*, has fallen off. Among the weeklies, two new types appear, destined to be very important—the illustrated paper and the railway paper. Four provincial journals use more than 100,000 stamps during the period—the *Manchester Guardian*, and the Leeds, Liverpool, and Stamford *Mercuries*.

The year 1846 is remarkable in the history of the press for the first experiment in cheap daily journalism by the foundation of the *Daily News*, and for the establishment of Mitchell's 'Newspaper Press Directory,' by means of which the statistics of the press can henceforth be accurately followed. Mitchell gives the number of newspapers existing at the commencement of 1846 as 550; but many publications requiring stamps, and hence enumerated in the returns to which we have hitherto referred, must be omitted from his list. A useful table gives the number of papers established in any year since 1660, by which it appears that the press had taken a considerable start since 1843. Forty-nine papers had been founded in 1845, and 22 in the first two months of 1846 only. 'A criterion,' remarks the compiler, 'of rapidly advancing civilisation, increased intelligence, and extended commerce.'

We shall best appreciate the progress of this remarkable movement, so faithfully interpreted by Mr. Mitchell or his author, by taking a long step in advance to the year 1875, when the materials for an estimate are compendiously afforded by Mr. Plummer's excellent article in the 'Companion to the British Almanac.' Changes had occurred in the interim which had

given a greater stimulus to newspaper enterprise than any accession to national prosperity could have done. The advertisement duty had been abolished in 1853, the stamp duty in 1855, the paper duty in 1861. In 1875 there were 325 papers published in London, 1,300 in the provinces, 149 in Scotland, and 137 in Ireland. The increase had been chiefly in English provincial papers, Scotch papers having only increased by seven since 1863, and Irish papers having actually decreased by three. But the English provincial papers had risen from 600 to 1,300. 'The increase,' says Mr. Plummer, 'is most marked in the agricultural districts, where the purchase of the local paper seems to have become habitual in most labouring-class families.' A still more remarkable fact was the vast development of professional and industrial papers, and of district and parochial journals, both classes having, almost without exception, sprung into existence with the abolition of the taxes on knowledge. The effect of this measure may be seen from the fact, that while between 1846 and 1851 the number of papers throughout the country had only increased by 12, between 1851 and 1861, the decade of reform, it nearly doubled, rising from 563 to 1,102. In 1880 the total number of newspapers, in the strict sense of the term, was estimated by the *Quarterly Review* at 1,376. Mitchell, for the same year, returns 1,737, which shows how estimates may vary according to the standard employed. There were 137 daily papers published out of London. Before the abolition of the stamp duty there had not been one.

At the beginning of 1887, the number of newspapers published in the British Islands is given by Mitchell's 'Newspaper Press Directory' as 2,135: 435 of them were published in the metropolis, 1,351 in the provinces, 191 in Scotland, and 158 in Ireland. The abolition of the stamp duty has, of course, long rendered it impossible to obtain any authentic data for the respective circulation of these journals, but there can be no doubt that newspaper circulation, taken as a whole, is continually on the increase.

The literary characteristics of the British press at the present day, including the employment of special correspondents, have been glanced at in our chapter on the literature of the Victorian epoch. Its ever-growing political and social importance, and the consequent increase of the duties and responsibilities of its conductors, are so plainly in the sight of

everyone that it would be a waste of time to expatiate upon them. To dwell upon certain checks and drawbacks to this influence would take us into the forbidden regions of political controversy; nor can we here discuss the legitimacy of some recent developments of journalism, nor their compatibility with the ideal of an upright and high-minded press. It must suffice to suggest, that a journalist who desires to be powerful must take care how he renders himself the slave either of a political party or of his own crotchets; and that an increase of circulation is not necessarily the same thing as an increase of influence. The prodigious improvements in press machinery would require a chapter to themselves. Some recent developments, however, admit of brief remark. They are, the establishment of central agencies by which the same news, sometimes of semi-official character, is supplied to many newspapers at once; the alteration by which the metropolitan correspondence of the leading provincial newspapers now consists of a number of paragraphs contributed from different sources, instead of being the composition of a single writer; the morning newspaper trains, which, by compelling the London papers to go to press at a comparatively early hour, frequently leave 'the House still sitting as we go to press;' and the publication of fiction, sometimes of a high class, as a recognised department of many provincial journals. One more very gratifying feature must not be omitted—the consolidation of journalism into a profession, largely by the help of the Newspaper Press Fund, and the consequent growth of friendly feeling and *esprit de corps* to a degree that, combined with the generally improved tone of public taste, has almost abolished the Eatanswillian amenities which, scarcely exaggerated by the satirist, amused the readers of 'Pickwick' at the beginning of her Majesty's reign.

R. G.

ART.

At the moment when these words are written there has just been opened at Manchester an exhibition which tells far better than any written pages the history of the art of the Queen's reign. There have been brought together some two thousand paintings, drawings, architectural designs, and works of sculpture which cover the whole period from the days when Turner was painting his 'Old Téméraire' down to the days of the last Academy. The story told by the Manchester Exhibition is a story, we will not say of wonderful progress, for progress in art is a matter on which it is extremely difficult to pronounce dogmatically, but of wonderful and increasing activity. England has in this department shared to the full the remarkable movement which has been witnessed all over Europe and America during the last fifty years. The growth of wealth, the increase of the leisured class, the subtle influence exercised upon life by the general widening of ideas, the more direct influence of the writings of various men of genius, with Mr. Ruskin at their head, have combined to increase enormously the demand for works of art; and with this positive encouragement to the artists there have come all the increased facilities afforded by organisation, by improved opportunities for study, and so vast a change in the social position of artists that, whereas fifty years ago a young man of talent was commonly dissuaded by his friends from

embracing the profession, the danger is now that he should be too much encouraged to enter it.

Art and artists in 1837.

In the year of the Queen's accession, of the multitudinous societies which now annually exhibit in London four were fairly flourishing, while the provincial societies hardly existed, and even Edinburgh had to wait till the next year before the Royal Scottish Academy was incorporated by royal charter. In London the Academy was holding its sixty-ninth exhibition. The Water-colour Society had been in existence for thirty-three years, and six years before the New Society of Painters in Water-Colours, afterwards to be called the Institute, had broken away from it. The Society of British Artists was beginning to prosper in Suffolk Street; it had been founded fourteen years, and ten years later was to receive a charter of incorporation.

The painters.

If we ask who were the artists exhibiting and what were the pictures of the year, we find a number of honoured names and a number of names whom time, *le seul classificateur impeccable*, has deposed from their pride of place. Sir Martin Shee was President of the Academy; the keeper was William Hilton, a man of lofty aims unrealised; and Turner, then sixty-two years of age, was not only assiduously painting visions of beauty which were yearly becoming more and more unearthly, but, strange as it may sound, held the post of Professor of Perspective and—more curious still, did we not know how businesslike this dreamer was—the post of Auditor. Among their colleagues were Sir William Beechey, the last depositary of the traditions of Sir Joshua; Augustus Callcott and Clarkson Stanfield, whom the public seemed disposed to prefer to Turner; William Collins, one of the soundest and most graceful artists of his day; and Charles Eastlake, more of a scholar than a painter, and soon destined to serve his country more successfully as Director of the National Gallery than as a

creative artist. Mulready had been for twenty years an Academician and was at the height of his popularity, and, though most of his best works had been painted, he had not yet given to the world the two charming pictures 'First Love' and 'The Sonnet,' which now hang at South Kensington. Charles Robert Leslie was in his prime; three years before he had returned from his brief sojourn in America and had flung himself with energy into the task of wedding literature and art in his pictures illustrating Shakespeare and Cervantes. Two great men of the older generation, Wilkie and James Ward, were still working; with what power and artistic knowledge the great Scotch artist still handled his brush is admitted by everyone who saw his 'commanded' picture of 'The Queen's First Council' when it hung at Burlington House last winter. Edwin Landseer, who had been elected an Associate in 1826 and an Academician in 1831, when he was but twenty-nine years of age, was doing his best work; for this was the year of 'The Shepherd's Grave,' and of the still more famous picture 'The Shepherd's Chief Mourner.' These are the most eminent of the Academicians of the day, and of the Associates it is worth while to mention the names of two excellent artists who never were very popular, George Arnald and J. J. Chalon, and of two who were perhaps more popular than they deserved, Daniel Maclise and F. R. Lee. In the next year the list was to be increased by the names of David Roberts and Richard Westmacott; and in 1840 by those of Thomas Webster, whose death at a ripe old age took place but a year or two ago, and of Sir Charles Barry, already famous as the architect of the new palace at Westminster. Chantrey, Gibson, and the elder Westmacott were the leading sculptors of the day; while among the Associate engravers we find the names of Charles Turner, who had worked for Alderman Boydell, and

of Samuel Cousins, who died, full of years and honours, but yesterday.

Though these were the men who may be taken as the more or less official representatives of English art at the time of the Queen's accession, the survey would still be very incomplete if it rested here. Much of the oil-painting of the day, even that done by 'eminent hands,' was undoubtedly and deplorably bad; was such as to give a cruelly apt handle to the severe criticisms of any trained Frenchman who might have the enterprise and the patience to walk through an English gallery; but in another branch of art we were then without a rival in Europe. Our great school of water-colour was flourishing and supreme. A critic of authority, Mr. Walter Armstrong, in a survey that he has recently written of the painting of the reign,[1] has taken the trouble to collect the names of the principal artists who were working in water-colour at the time of the Queen's accession, with the dates of their birth and death, and from this list we may be allowed to borrow a few names. Turner had still fourteen years of life before him, and while in oil-colour his hand or his eye seemed to have lost something of its mastery, or his judgment to have begun to mislead him as to the limits of what painting could do, in water-colour he was just as true as ever, and almost more magical. On a screen in the Manchester Exhibition there hang no less than fifteen of his drawings, all admirable, and many of them supreme, and of these none was executed before the year 1837. They include the three Righis—the 'Red Righi,' the 'Blue Righi,' and another—a fine 'Whitehaven' and a superb 'Land's End,' the beautiful 'Lowestoft,' which was engraved in the England and Wales series, and the 'Chain Bridge over the Tees,' which was reproduced in Whitaker's 'History of Richmondshire.' These

Water-colour in 1837.

[1] *Art Journal*, June 1887.

were the drawings to which Turner was giving his leisure, and if time and the sunlight spare them they will continue to do as much for his fame as any of his pictures can do. But beyond and besides Turner there were working a whole group of men who, it has been truly said, 'but for the modesty of their work, would by this time be famous all over Europe.' To what shall we attribute it that they are not, while everybody who cares for modern art, whether he dwells in Berlin or in Florence, in Vienna or Amsterdam, is familiar with Corot and Decamps? To the fact, as M. Charles Blanc says, that the English are always asserting themselves, and that France 'is the only people in the world which holds itself cheap?'[1]

David Cox was fifty-four years old at the Queen's accession, and was doing his very best work, unless indeed his best work was painted later still; George Barret, the date of whose birth is not known, can hardly have been the junior of Cox, since he exhibited at the Academy in the year 1800; and Peter de Wint, who alone perhaps is worthy to be ranked with those two as a water-colour painter, was of just the same age, and had twelve more years to live. Copley Fielding was fifty; the veteran John Glover, whose best days were long over, was seventy; J. D. Harding, to whose instructions two generations of water-colour painters owe a heavy debt, was not forty, and was to paint for twenty-five years more; James Holland was thirty-seven, and for another thirty-three years was to exhibit, in water-colour and in oil, Venetian subjects, English landscapes, and flower-pieces, which, moderately appreciated in his own day, are now earning for him high posthumous fame; William Hunt, the poet of fruit and flowers, the masterly delineator of rustic childhood and old age, was forty-seven, and was for another twenty-

[1] Charles Blanc, *Les Trésors d'Art à Manchester*, Paris, 1857.

five years to remain one of the glories of the old Water-Colour Society. John Frederick Lewis, equally at home in water-colour and in oil, was but thirty-two, and stood at the beginning of a career in which he was to show himself a master of colour, and, if we may quote without adopting Mr. Ruskin's panegyric, 'was doing work which surpassed in execution everything extant since Carpaccio;'[1] William Müller, a colourist also, and at some moments a rival of the great Constable, was but twenty-five, and was to close a short life of promise only eight years later; Samuel Prout, the contemporary of Cox, was 'according to his strength doing true things with a loving mind;' and John Varley, five years older, and not equalling at this late date the rich, expressive work of his earlier years, was still exhibiting.

Haydon and Etty.

Two painters, whom many of their contemporaries believed to be great, were nearing the close of their career. One was Benjamin Robert Haydon, the friend of Keats and of many another poet and man of letters, and himself an artist who, if he had lived in a society where the discipline of sound tradition and of a trained opinion was more easily to be obtained than in London, might have done great work. Thirty years before he had been one of the first to recognise the beauty of the Elgin marbles, and, inspired by them with a love for the ideal and the grand, he produced many a picture from classical history or from the religious history of Christendom. But his portion was to alternate unprofitable fame with the debtor's prison. In 1822, in 1830, and in 1835 he was in gaol, and, by way of a crowning disappointment, he was not chosen to aid in that great scheme which was expected to do so much for art in England, the decoration of the new House of Commons. From his diary, the work of a disappointed

[1] *Notes on the Pictures in the Royal Academy*, 1875.

man of genius, we see how heavily these continued discouragements weighed upon his mind; and after frequently giving expression to his pain in language as strong as Barry's without Barry's bitterness, he failed any longer to continue the fight. On June 26, 1846, he wrote in his diary, 'God forgive me! Amen. Finis. "Stretch me no longer on the rack of this rough world"—Lear,' and then committed suicide. Recently for some years his large picture of 'The Raising of Lazarus' was hung on the staircase of the National Gallery; but it only needed a comparison between this picture, bold in conception but conventional in its types, and in its execution totally without distinction, and the great rendering of the same subject by Sebastiano del Piombo, to see how entirely beyond the scope of the English school of that day was any composition in the Grand Style. The other painter to whom we are referring was William Etty—a man who, having passed through a youth of struggle scarcely less painful than that of Haydon, had at last attained both fortune and fame. He was born at York in 1787; his first picture was hung in 1811, and ten years later he was celebrated, and his picture of Cleopatra was sold at what then seemed to be the considerable price of two hundred guineas. Both before and after this latter date he travelled in Italy, steeping himself in the colour of Veronese and Titian, and giving to the city of Venice the second place in his heart after his dear native city of York. At forty he became an Academician, and from this time forward his pictures were regarded by the educated opinion of his time as among the greatest of modern works of genius. A paragraph in a newspaper of the year 1847, two years before his death, records that 'Messrs. Colls and Wass have bought (on speculation) Etty's picture of "Joan of Arc" for two thousand five hundred guineas,' a fact which should be borne in mind when it is

said that the painters of that day never obtained high prices. The beauties indeed of Etty's work were manifest; their defects were not likely to be harshly judged or perhaps perceived by a generation accustomed to the slipshod execution, incorrect drawing, and theatrical composition which then passed muster in England. People saw with perfect truth that Etty in his best work was a master of flesh-painting such as the world, and not the English school alone, had very seldom seen before; they admired with a justifiable admiration the lovely colour of his 'Bathers' and of his dancing girls; they saw that at his best the texture of flesh in Etty's pictures would hold its own beside the similar work of Rubens. They cared but little that his compositions were forced and his drawing often detestable, that his faces were without expression and his heads joined to their bodies by impossible necks. Etty's fame during the early portion of the Queen's reign is a very interesting phenomenon, and none the less because it contributed not a little to the pre-Raphaelite revolt. His current paintings, writes Mr. Holman Hunt, of the period of about 1844, 'were cloysome in their richness and sweetness, and his forms were muddled and even indelicate in the evidence they bore of being servilely copied from stripped models who had been distorted by the modiste's art.' 'He was painting classic subjects with the taste of a Parisian paperhanger,' adds the same stern critic; and it must be owned that even if Etty himself scarcely deserves this severe judgment, the evil effects of his example are pretty evident in the Books of Beauty of the day. Men were taught to look for beauty 'at the expense of truth and manliness;' but the teaching was bringing about a natural reaction.

It was about ten or eleven years after the beginning of the reign that the vague spirit of unrest which was then

The pre-Raphaelite movement.

abroad in almost every department of life throughout Europe began to make itself felt in English art. Eighteen years before, the Revolution of July had overturned the Legitimate monarchy in France, and the popular uprising had been accompanied by a literary and artistic movement of immense significance. Victor Hugo and George Sand on the one side, and on the other, first Delacroix and then the landscape painters Corot, Rousseau, and their fellow-workers, had given varied expression to the modern revolt against conventionality and stereotyped forms. We in England had had our literary revolt a generation earlier in the poetry of Wordsworth and Coleridge, of Shelley and Keats. But in art we moved more slowly, and it was not till the early years of the present reign that old traditions and academical dullness received the necessary shock which was the prelude to new life in art. So much has been written of late years of the pre-Raphaelite movement, for the benefit of those who do not remember its early days, and with the older generation the recollection of its struggles and controversies is so vivid, that any minute account of it here would be superfluous. The outcome of it is written at full length in the works of Mr. Ruskin, and the details of it, as embodied in the artistic biography of one of the foremost actors, has lately been told by Mr. Holman Hunt.[1] Moreover, the present generation has had an unrivalled opportunity of tracing its history, and of observing its influence as it was afterwards developed and affected by other influences, in the exhibition which was held last year of the works of Sir John Millais. Mr. Holman Hunt has described how the definite formation of the Pre-Raphaelite Brotherhood arose in 1848, and may be dated from the meeting of three young and struggling artists—

[1] 'The Pre-Raphaelite Brotherhood; a Fight for Art,' *Contemporary Review*, 1886.

himself, Millais, and Dante Gabriel Rossetti—at Millais's house, where there happened to be a book of engravings of the frescoes in the Campo Santo at Pisa. 'Millais, Rossetti, and myself,' he writes, 'were all seeking for some sure ground, some starting point, for our art which would be secure, if it were ever so humble. As we searched through this book of engravings we found in them, or thought we found, that freedom from corruption, pride, and disease for which we sought. Here there was at last no trace of decline, no conventionality, no arrogance. Whatever the imperfection, the whole spirit of the art was simple and sincere—was, as Ruskin afterwards said, "eternally and unalterably true." Think what a revelation it was to find such work at such a moment, and to recognise it with the triple enthusiasm of our three spirits!' The three young Brethren who then and there determined to associate themselves in a new effort were all of them remarkable men. Mr. Hunt describes himself as a steady and even enthusiastic worker; patient determination has always been the note of his character, and at that date it carried him through more than the proverbial difficulties which are wont to beset a young and ambitious artist in his days of struggle. What Millais was and is we know—a man endowed, to use Mr. Hunt's words, with 'a rare combination of extraordinary artistic faculty with an amount of sterling English common sense,' and possessed moreover, at the time, by a spirit of generous enthusiasm that formed that moral basis of his genius. But the most original of the three, the man of the quickest and most independent insight, and of the greatest initiating force, was undoubtedly Rossetti. The son of an English mother and of the well-known Italian professor and commentator upon Dante, this youth went about our nineteenth-century London with the thoughts and feelings of a Florentine of the later middle age. So

Holman Hunt.

Millais.

Rossetti.

much has been said and written about him since in 1870 he was induced to publish his poems, and since after his death the Royal Academy collected and displayed the pictures which he would never consent to exhibit in his lifetime, that we may be excused from dwelling on him at any length; on the marvellous memory which enabled him to declaim to his favoured little audiences page after page of poetry—poetry gathered from the Italians of the thirteenth century or by hundreds of lines from 'Sordello' and 'Paracelsus'—on his scorn for little social conventions, on his belief in the power of art to awake a soul in the English millionaire. But here is Mr. Hunt's analysis of what may be called the central position in Rossetti's philosophy; and this it is well worth while to quote, for it tends to explain the special form which pre-Raphaelite art took in England: 'The studying of poetic schools had never led him to profess any respect for natural science or to evince any regard for the remote stages of creative development or the lower steps of human progress. He regarded such studies as altogether foreign to poetry. The language used in early times to describe the appearances of nature he accepted as the exclusive and ever-sufficient formulæ. The modern discoveries of science therefore had no charms for him; neither had the changed condition of the people who were to be touched by art any claim for special consideration. They had no right to be different from the people of Dante's time, if I may use my own words to epitomise his meaning.'

Each of the three young painters had done a good deal of work before 1849, but it is from the May of that year that we may date the beginning of pre-Raphaelitism viewed as an influence upon English art. In that year Rossetti exhibited 'The Girlhood of Mary Virgin' at the Hyde Park Gallery, Holman Hunt 'Rienzi' at the Academy, and

Millais, as a pendant to this latter, the now famous picture of 'Lorenzo and Isabella,' surely one of the most marvellous works ever achieved by a lad under twenty years of age. This last has lately been thought worthy of purchase at a high price by the Corporation of Liverpool for their public gallery; for since 1849 we have at least developed an historical sense in matters of art, and, whether we agree with the theory of a picture or not, we know when it has fine qualities, and we know when it represents an epoch in art-history. But to the men who held the position of professed critics at that time the first law of criticism as we now understand it was unknown. They never cared to get at the artist's point of view. They were content to dispose of the 'Lorenzo' as 'affected' and the 'Christ in the House of His Parents,' which followed in the next year, as 'revolting.'

Among the pre-Raphaelite Brethren were presently enrolled three more artists and one writer—James Collinson, F. G. Stephens, Thomas Woolner, and William Michael Rossetti—while outside there gradually arose a little band of sympathisers. Mr. Ford Madox-Brown, an older man than any of the group, held aloof from actual membership, but his work exercised no little influence upon the Brethren. A few months after the exhibition of the pictures we have named it was determined to found a literary organ for the Brotherhood, and the result was that little magazine which is now so much prized by collectors, '*The Germ*: Thoughts towards Nature in Poetry, Literature, and Art.' A short preface announced that 'the endeavour held in view throughout the writings on art will be to encourage and enforce an entire adherence to the simplicity of nature, and also to direct attention as an auxiliary medium to the comparatively few works which art has yet produced in this spirit.' *The Germ*, though it con- 'The Germ.'

tained such poetry as Rossetti's 'Blessed Damozel,' only lived through four numbers. It was one thing to influence a few artists, who in their turn and in their time should spread the new principles widely among those who cared for art, and quite another to command instantaneously a large literary audience.

Mr. Ruskin.

But though the public could not appreciate *The Germ*, they could not fail to be touched and deeply moved by another literary influence which preceded, accompanied, and followed the pre-Raphaelite movement. In another chapter something has been said of the general literary qualities and value of the work of Mr. Ruskin, but his special effect upon art is so important that a few words upon it become imperative. The 'Graduate of Oxford' still lives, and from his beautiful home on the banks of Coniston he writes from time to time what is read as widely as the first copies of 'Modern Painters' were read, though mainly by a different class. But not again can the glow of emotion be felt with which the receptive minds of forty years ago welcomed the volume, afterwards developed into five, in which the 'young man eloquent' described the ideal of the painter, and showed how Claude had missed and Turner realised it.[1] It is difficult to summarise a great book in a sentence, or in a page, but Mr. Ruskin's teaching is perhaps less difficult to describe than that of many other critics and philosophers. The foundation of it is moral, and is identical with Carlyle's, for Carlyle, whom Mr. Ruskin has often called 'my master,' had a powerful influence upon him. To speak and do the truth; to walk humbly in the presence of nature, to reverence everything except claptrap and convention, this was the basis of Mr.

[1] *Modern Painters* first appeared in 1845, in one vol. 8vo; 2nd edit. 1846; 3rd edit. 1846, in two vols. royal 8vo. Three more volumes (illustrated) followed in 1856 and 1860. *The Seven Lamps of Architecture* appeared in 1849; *The Stones of Venice*, 3 vols. 1853.

Ruskin's doctrine, as of Carlyle's. What gave it its special application was more or less an accident. The young man, whom nature had endowed with keen artistic sensibility, had been brought across Turner, and his father, a wealthy man, had been induced by him to buy Turner's drawings. Thus he had been led to study Turner, both his character and his art, with unusual care, and, deeming that the great artist was not rightly valued by his contemporaries, especially by the writers in the newspapers, he wrote what was meant to be a pamphlet, but what became first one volume and then five, in Turner's defence. What began with the criticism of one man grew into a philosophy of art. A keen though wayward intelligence, a genuine delight in Turner's work and in that of many of his contemporaries, and a gift of eloquence unrivalled among English prose-writers of that or perhaps of any age, combined to give Mr. Ruskin a position of great influence. Thousands of readers, when they rose from his volumes, began to look on Nature with new eyes. They may, in many cases, have fancied they saw in her what there is not; but they were at least taught to look and to reverence. The unquestionable truth that Mr. Ruskin's influence on the artists themselves has been but partial and passing suggests that something was fundamentally wrong in his artistic theories; but it does not alter the fact that his writings, by their stimulating quality, by the manner in which he seemed to probe nature and art to the bottom, have been of immeasurable service to his generation.

As regards the pre-Raphaelites, Mr. Ruskin did much to secure them a fair hearing. He wrote two letters to the *Times* in 1851 in defence of their pictures in the Academy exhibition; and the professed critics had henceforth to justify their attacks on the new manner. In the same year he wrote a pamphlet which he called 'Pre-Raphaelitism,' and in which, with much that was not very relevant, he showed

the essential *rightness* of the method in which the young Millais and Holman Hunt were approaching art. He had long since advised young artists, he said, 'that they should go to Nature in all singleness of heart, and walk with her laboriously and trustingly, having no other thought but to penetrate her meaning, rejecting nothing, selecting nothing, and scorning nothing.' How an artist is to avoid selection the writer did not explain, but he saw his advice taken, to the best of human ability, in the 'Two Gentlemen of Verona' and in the 'Ophelia.' But he gave up the cause of the extreme pre-Raphaelites a few pages farther on, where he warned the painters that 'there are certain qualities in drawing which they miss from over-carefulness'—the qualities, that is to say, of boldness, mastery, and breadth. They, or at least the chief of them, soon came to see this as clearly as the critic; and the work of Millais after 1860 showed that the lesson had been learnt.

Effects of the pre-Raphaelite movement.

The work of the pre-Raphaelite movement has in the main been accomplished, and the influences now chiefly acting upon art are of an opposite tendency. But it has left its mark upon many of the greatest artists of our day. It is responsible for much of the exquisite art of Mr. Burne-Jones, and Mr. W. B. Richmond's early pictures are full of it. Mr. Watts, the noblest ideal painter that England has ever seen, would scarcely have done the work that he has done had it not been for the serious severity that was introduced into English art by the Brotherhood. Even in the supremely scholarly work of Sir Frederick Leighton we may see a development of pre-Raphaelitism; and, in another field, we may say that without it English decorative art would hardly have witnessed the revival brought about by Mr. William Morris.

The next great influence upon English art came from without, and has had its effect not so much upon schools

of painting or upon the works of individual painters as upon the general artistic education of the country. In a country like England the Court, though it may set the tone in certain departments of life, has naturally much less influence upon a matter so widespread as the national arts than is the case in most foreign countries. But in the twenty years that followed 1840 a new condition, more important than many people were aware, was introduced into England. A man of fine intelligence, great practical tact, extraordinary power of work, and remarkable strength of will came to occupy the position next the throne. We are accustomed to find the character and influence of the Prince Consort misunderstood through courtier-like exaggeration on the one side, and through the survival of an old jealousy on the other; and this misunderstanding, though principally to be found in the estimates of his political position, is also commonly extended to estimates of his influence upon the arts. It may be admitted that upon painting he had no direct influence, and indeed it could hardly be expected that one whose taste approved Cornelius and Winterhalter should awake much response among English artists or amateurs. But on the development of industrial art, and on the contemporary extension of a love for beautiful things as such throughout the whole educated classes of the country, his influence was very great indeed. He gave the push that was wanted. The Great Exhibition of 1851 was his doing, and though we may shudder at the recollection of what that exhibition revealed as to the state of English design and decoration at the time, it was no light achievement to bring together such conclusive evidence of our weakness as well as of our strength.

The Prince Consort and the Exhibition of 1851.

Several events of the next decade bore remarkable evidence to this new development of a national interest in art. Among them may be mentioned the reorganisation of

1850-60.

the National Gallery, the establishment of the Science and Art Department, with its headquarters in the newly founded and rapidly growing museum at South Kensington, and the National Exhibition of Art Treasures held at Manchester in 1857.

The National Gallery.

The National Gallery, although founded some thirteen years before the Queen came to the throne, can only be said to have assumed any very great importance during her reign. It was on April 9, 1838, that the building in Trafalgar Square was opened to the public, the pictures which belonged to the nation having till then been exhibited at the house in Pall Mall where Mr. Angerstein, whose collection forms the nucleus of the Gallery, had lived. Every year saw some remarkable additions; in 1837 we note the acquisition of Murillo's 'Holy Family' and of Constable's 'Cornfield,' the latter a gift from a group of Constable's admirers; in the next year Lord Farnborough's bequest of Dutch pictures; in the next the purchase of Raphael's 'St. Catharine.' At short intervals came Sir Joshua's 'Angels' Heads,' a gift from Lady William Gordon, Rembrandt's 'Jewish Rabbi' and Bellini's 'Doge Loredano' (1844), and in 1847 the great bequest of Mr. Vernon, consisting of no less than a hundred and fifty-five pictures of the British school. Unfortunately, far too many of these last pictures exemplify the least excellent side of the English art of the epoch. How invaluable might that bequest have been had Mr. Vernon been more moderate in his admiration for Leslie and Maclise, and have substituted for the greater number of their pictures a few fine Sir Joshuas and a collection really representative of the noble Norwich school of landscape! In 1855, on the report of a School Committee of the House of Commons, the administration of the Gallery was reorganised—none too soon—and Sir Charles Eastlake, a painter of great taste and well acquainted with

Italian art, was appointed Director. From that time additions of immense value have been annually made to the Gallery; in 1876, after Eastlake's death, the multitude of its possessions made it necessary to enlarge the building, and a number of new rooms were added from the designs of Mr. E. M. Barry. Still the increase went on, and at the moment when these words are written the public is waiting with some impatience for the opening of yet more rooms which will relieve the principal gallery from the necessity under which it has long laboured of being cumbered with screens. When these buildings are completed—and their completion is now a question of months or even weeks—it will be seen even more readily than it is seen at present that little by little we have, during the past thirty years, raised our Gallery from one of the second or third order to one that will compare with any of the galleries of Europe. The purchase of the late Sir Robert Peel's collection enriched the nation with some seventy Dutch and Flemish pictures of the first importance. The Italian rooms have grown in wealth from year to year until there is now no great Italian name unrepresented, while such a purchase as that of Raphael's 'Ansidei Madonna' from Blenheim for the gigantic sum of 70,000*l.* (almost exactly the price paid for the whole Peel collection) has shown the determination of Parliament to pay even unprecedented prices for the possession of real masterpieces. It is unfortunate that this grant should have been made subject to the condition that the ordinary annual grant was to be suspended for a time—a piece of ill-judged economy which deprives Sir Frederick Burton of the opportunity of securing many a bargain for the nation, and that too at a moment when the fall in agricultural prices is compelling many of the old English families to sell their artistic possessions. It is unfortunate also that the development of the English side of the Gallery has not

quite kept pace with that of the foreign side. We have had, indeed, such bequests as those of Mr. Vernon, Mr. Jacob Bell, and of Turner, but to depend on bequests is to depend on chance, and the representation of the English school in an English National Gallery cannot be said to be adequate, so long as the Gallery contains no first-rate lady's portrait by Reynolds, and no first-rate work of Crome, Cotman, Vincent, Holland, Cox, or William Müller.

Manchester Art Treasures Exhibition, 1857.

The Manchester Art Treasures Exhibition, held in 1857, was an event of great importance in the history of art in England. Organised in part with the view that it would lead to the establishment of a museum of industrial art in the industrial capital, it rapidly developed into a display of the most priceless treasures, and was to the art world of Europe the first revelation of the wonderful artistic wealth of the private collections of England. If the local patriotism of Lancashire helped in one way to assure the success of such an exhibition which then was an entire novelty, it was largely seconded by the patriotism of wealthy owners throughout the country. The great houses seemed to compete for pre-eminence in art, and the newer collectors entered into rivalry with them, with the result, to use the words of a French critic[1] by no means too favourable to England, that 'you might have imagined a palace of glass in which were gathered together the great gallery of the Louvre, the Cluny Museum, the Cabinet of Medals, and the hidden stores of the Cabinet of Engravings,' and with these such a collection of armour, of Etruscan vases, of miniatures and enamels, of historical portraits, and of the artistic products of the East as it would be impossible to find elsewhere in the world. No school of painting was unrepresented by its greatest masters: Italian, German, Flemish, Dutch, French, Spanish, English, all might here be judged

[1] Charles Blanc.

more thoroughly and enjoyed more fully than in any European gallery, except perhaps the Louvre; while in all the other departments of fine art the collection was of an importance which no one had foreseen, and which amazed every connoisseur who visited it. Nowadays we are overdone with exhibitions, but thirty years ago displays of this kind were new. The effect of the Manchester Exhibition was great and far-reaching. On the artists themselves it may have had but little direct influence, for artists are only affected by the works of great masters when they live among them and spend a long time in studying or copying them; but it spread the regard for art into many quarters where it had not been entertained before. It sent up the price of pictures. It taught multitudes of working men what fine things had been done in the world by human hands. It set a fashion for art exhibitions which has gone on increasing to the present time. It gave a powerful stimulus to the growth of the South Kensington Museum and its branches throughout the country.

The Science and Art Department.

The beginnings of that great organisation now called the Science and Art Department are to be found a little earlier than the Queen's accession. In 1835 a Select Committee of the House of Commons was appointed 'to inquire into the best means of extending a knowledge of the arts and principles of design among the people (especially the manufacturing population) of the country'; and as a result there was constituted in 1837 what was called a Council of the Government School of Design, with its headquarters in Somerset House. The movement grew; in 1842 a Director was appointed, who had under his supervision certain provincial schools as well as the central school in London, and the original grant of 1,500*l.* a year had expanded to 15,000*l.* Nine years later the great Exhibition of 1851 was held, and when it was over the Prince Consort took

up with energy the question of developing, on the one hand, the art teaching of the country, and, on the other, the formation of the central museum, which was to contain examples of everything that was best and finest in human handiwork. In 1852 the Department of Practical Art was established, with Mr. Henry Cole as its head, and next year this was transformed and enlarged into the Science and Art Department, which, after being for three years under the control of the Board of Trade, passed in 1856 under that of the Lord-President and the Vice-President of the Council. At the same time Parliament voted 10,000*l.* for transferring the Department from Marlborough House to South Kensington, where were soon installed the possessions which had as yet been bought or given, including what the Government had bought at the sale of the Bernal Collection (1853) at prices which may drive the modern collector to despair. Gifts poured in, beginning with that of the Sheepshanks Collection of English pictures and drawings, a gift which was followed by those of Mrs. Ellison in 1860, of Mr. Townshend in 1868, of the Dyce Collection in 1869, of Mr. William Smith's water-colours in 1871 and 1876, of Mr. John Forster's library in the same year, and, four years later, by the immensely valuable bequest of French furniture, porcelain, &c., by Mr. John Jones. With these are to be reckoned the purchases that have been largely made in all departments of industrial art, and the formation of the large and very complete art library, at a total cost of nearly 500,000*l.* sterling. Not all the possessions of the Museum are kept at South Kensington; a great number of them are lent to the branch museums, which have a more or less direct dependence upon the Department, at Bethnal Green and at Nottingham and several other towns.

It must not, however, be supposed that the work of the

Department is confined to the organisation of one or many museums. On the contrary, it organises the teaching of elementary art, and in many cases of art that is not elementary, throughout the country, besides doing similar work in respect of natural science. It has its own 'National Art Training School,' at South Kensington, for the training of teachers for schools of art. It directs the teaching of drawing in every elementary school, and it has established a wide system of examination. Over 800,000 children in the public elementary schools learn drawing under its auspices; in 200 schools of art there were, in the year 1885, 36,960 students, and in 488 art classes 23,410 students; the work of the Department, including science as well as art, costing the country about 400,000*l.* a year.[1]

Art teaching in England.

From the work of the Science and Art Department the transition is easy to the general system of art teaching, in its higher branches, which obtains in England. The great difference between this country and France in the matter of art training is to be found in the fact that here the *atelier* system has never really taken root. Everybody remembers the training that Clive Newcome went through under the eminent Mr. Gandish, of Soho, and what Clive did then has been done by many another young artist, down to the time when Frederick Walker attended the evening classes in Leigh's school, in Newman Street, after he had spent his day in copying Greek marbles in the British Museum. But in England these *ateliers* have generally been conducted by masters who, whatever else they were, were not great artists. In France it is almost as incumbent upon a great man to have a studio full of pupils as to paint pictures; and in a catalogue of the Salon every artist's name is given as *élève de Gérôme, de*

[1] These figures are taken from an article by Mr. Gilbert Redgrave in the *Art Journal*, June 1887.

Bonnat, de J-P. Laurens, or what not. Whatever the good and evil of such a system, it does not prevail here, and it is only lately that one single artist of the first rank, Mr. Herkomer, has ventured to introduce the Continental system, and to set up a school of his own at Bushey. The plan which is followed here is, generally speaking, that of schools attached to the great art institutions of the country, especially to the Royal Academy. The Royal Academy Schools, which have existed since the beginning of the institution, and which among other uses have given occasion to many admirable Presidential addresses from the days of Sir Joshua downwards, now afford instruction to a large number of pupils, male and female, who may there study all the higher branches of art—painting, sculpture, and architecture.

The Royal Academy Schools.

But though permanent assistant teachers are provided, the schools have this peculiarity: that they are directed in turn by the various Academicians, who each for his week or month takes the supervision of the classes. Whether this is the best method of instruction is a question which is now being warmly debated, and upon which it would be presumptuous for any but an artist to give an opinion. The artists themselves take different views, and while some declare strongly for the French system, others of great authority regard the English method as the best, and as affording to the student not only abundant facilities for work but a sufficiently methodical training. It may be stated, however, that of late years a choice of methods has been afforded to students, for while on the one hand the Water-colour Institute has established schools of water-colour painting on the model of those of the Academy, the Slade School, founded by the munificence of the late Mr. Felix Slade, has afforded during the last fifteen years the opportunity of working on a different plan to many hun-

dreds of students. At one time the Director of the school was Mr. Poynter; it is now the distinguished French artist M. Legros, who appears to have relinquished the practice of his art in favour of teaching.

Art in 1853-55.

We have thus been led into what may seem a digression from the story of the English school of painting. Returning to it, and to the point at which we left it, we find three significant events taking place within two years which may be taken as in their different ways landmarks in the history of English art. In 1853 Millais, then just four-and-twenty years of age, was elected Associate of the Royal Academy; in 1855 Copley Fielding died; and in that year a number of English pictures appeared at the Paris Exhibition and made a sensation. The first event marked at once the official recognition of the leading pre-Raphaelite painter, and to a certain extent the modification on his part of his earlier manner. The second marked practically the end of that great period of English water-colour art when the school was led by what Mr. Ruskin has called 'the great primary masters of the trade.' The third event marked the first conscious attempt of the English school of painting to take its place with the schools of the Continent, and at the same time may be said to have first opened the door to that French influence upon English art which is now so manifest in every exhibition. Millais had in 1850 horrified the critics, and tried the faith even of those who saw promise in the new school, by his 'Christ in the House of His Parents;' in 1851 he had been as archaic as ever, but more brilliant, in 'The Return of the Dove to the Ark;' in 1852 he had painted the first of his popular pictures, the famous 'Huguenot,' with its magnificent execution and its subject of which the pathos touched every heart. Opposition, which wavered in the presence of this picture, broke down before the work of the next year, that

Millais elected A.R.A.

'Order of Release' which soon, in the engraving, disputed the palm of popularity with the most favourite works of Landseer. The election of the brilliant youth was thought quite natural after such a success, and from this time it ceased to be uncommon for young painters to send works to the Academy which showed some traces of that conscientious handling of detail, that preference for exact imitation over facile generalisation, which had been taught by the painter of 'The Christian Missionary' and by the writers in *The Germ*. But in the work of the painter who had succeeded in winning this triumph for his principles a subtle change was beginning to be visible, and from the date of 'The Order of Release' there might year after year be traced some slight departure from the old method, until his pictures gradually assumed the breadth and freedom which have been their dominant qualities for the last eighteen or twenty years. 'Truth of external fact,' which had been the aim of the young pre-Raphaelites, gave way to 'truth of impression;' the artist came to see that as all art must of necessity imply selection, and as it is hopeless for the painter to attempt to rival the multitudinous variety of nature, his work may be as true when it is done with the broad sweep and dashing execution of Velasquez as when done with the patient minuteness of Van Eyck.

Death of Copley Fielding.

The death of Copley Fielding, President of the old Water-colour Society, marks, as we have said, another epoch. Turner had preceded him to the grave by four years, Peter de Wint by six years, while David Cox survived him, and died in 1859; and all these were greater men than he. But Fielding was by his official position the most prominent representative of water-colour art, and his method was perhaps more definitely characteristic of the English school than that of any of the three artists we have named. Turner was above and beyond all schools; Cox

and De Wint might both of them have made a great name in France, but Fielding in his strength and weakness was purely English. Without the force of genius or either the power or the wish to strike out new lines for himself, he carried on with exquisite skill the methods that he had learnt in his youth, until in his hands the very light of noonday was transferred to the paper, and the English landscape shone under a transparent sky. By him and, to a less extent, by his fellow-workers, if we may quote the words of one of Mr. Ruskin's later Oxford lectures, 'the skill of laying a perfectly even and smooth tint with absolute precision of complex outline was attained to a degree which no amateur draughtsman can have the least conception of. . . . Then further on such basis of well-laid primary tint the old water-colour men were wont to attain their effects of atmosphere by the most delicate washes of transparent colour, reaching subtleties of gradation in misty light which were wholly unthought of before their time. In this kind the depth of far distant brightness, freshness, and mystery of morning air with which Copley Fielding used to invest the ridges of the South Downs, as they rose out of the blue Sussex champaign, remains, and I believe must remain, insuperable, while his sense of beauty in the cloud-forms associated with the higher mountains enabled him to invest the comparatively modest scenery of our own island—out of which he never travelled—with a charm seldom attained by the most ambitious painters of Alp or Apennine.'

'The old water-colour men.'

For all this Fielding and his colleagues were never in the proper sense of the term appreciated in their lifetime, and their drawings sold for prices which would now be scornfully refused by third-rate members of insignificant societies. David Cox in 1845 sold his large drawings for nineteen guineas apiece, and his famous oil-picture called

'The Skylark' was bought from the Birmingham Exhibition of 1849 for 40*l.* Ten years later, in the year of Cox's death, this picture was resold to Mr. Mayou for 50*l.*, and in Mr. Mayou's possession it remained till 1872, when he sold it to Mr. Nettlefold, its present owner, for 2,300*l.*[1] Similar stories are told of most of the best work of that group of artists by old collectors; and it is common enough for drawings by De Wint now to bring eight or nine hundred guineas which in his lifetime he sold as a regular thing for fifty or sixty. It is not, then, surprising that artists found it difficult to live by the practice of their art alone; and to men like these three it was commonly a necessity to seek their main support through teaching. The amenities of social life were not for them; if they saw anything of the cultured class, the class of gentlemen, it was on a footing of anything but equality. Occasionally a man of fashion or family would invite them, but it was, as in De Wint's case, only in the way of business—to set them some task, to get them to draw scenes in the neighbourhood, and meanwhile to treat them with just that kindness that a well-bred aristocrat shows to a dependent. To decide whether it was a bad thing, this severance of classes, which made the artists associate almost exclusively with each other, which made David Cox—'old farmer Cox' as his friends called him—remain to the end of his days as rustic as his pictures, and De Wint alternate between roughness to his equals and deference to the great, is a question which will be answered according as we regard the great social changes of the past fifty years to have brought good or evil in their train. At all events, things are different now. The fashionable portrait-painters have indeed been always men of fashion; Landseer moved as an equal among the men for whom he painted the animals that they fondled and the animals that

[1] *David Cox: A Biography*, by William Hall, p. 258.

they shot; but Landseer and the portrait-painters held an exceptional position. Now, with the growth of wealth, the rise of prices, and the competition that has existed for the last thirty years among the buyers of pictures, the artist's position has changed, and the danger for a man of talent is not that he should starve, but that rapid prosperity should lead him to forsake or to debase his art.

English pictures in Paris, 1855.

The second event of the year 1855 was, as we have stated, the appearance of a number of English pictures on the walls of the Paris Exhibition. They made a considerable impression, though not so deep as was made by those which were shown twelve years later in the Exhibition of 1867, and again in 1878. Moreover, the impression was mutual, for the English painters followed their pictures to Paris, and were able to compare them on the spot with the works of their French brethren. From this moment we may date the beginnings of that French influence on English art which is now one of the striking features of the time, and which in fact may be set down as one of the three formative influences that have made English contemporary art what it is, the other two being the pre-Raphaelite movement and the example of Frederick Walker and George Mason.

Frederick Walker and G. H. Mason.

In one of the rooms at the Manchester Exhibition there are now gathered together a score of the rare works of these two men, both of them cut off in their early prime[1]— 'The Harvest Moon' of the one and 'The Ploughers,' 'The Vagrants,' 'The Lost Path,' and 'The Sunny Thames' of the other. All these have been made widely known of late through Mr. Macbeth's beautiful etchings, but it is necessary to see the pictures themselves if one would estimate the influence which the two idyllic painters have had upon

[1] G. H. Mason, A.R.A. died 1872; Frederick Walker, A.R.A., and G. J. Pinwell died 1875, which year was also the date of the death of Alfred Stevens.

the subsequent art of England. Both had technical faults in abundance; neither was perfect as a draughtsman, and Mason's drawing was often unquestionably bad; but both had a sense of the inner realities of rural nature for which we look in vain in the pictures of any of their predecessors. It has been said that Walker had 'a special power of drawing from reality some secret of beauty that escapes common observation;'[1] it may be added that he had a knowledge of peasant character in which Millet alone surpassed him, while he saw in rustic life an element of happiness and grace which Millet never admitted, and that he was ever recognising that 'good gigantic smile o' the brown old earth' which seems hardly to have existed for the Norman peasant-painter.

Under these, and a number of influences too subtle for analysis, has been formed the very various but still remarkable school of painters whose names are now so familiar. Because they are familiar, we need not dwell upon them. Any competent notice in a newspaper—and every newspaper now strives to have competent notices of the exhibitions—will say what there is to say of the work of these men, and will point to the choice and varied work of Leighton and Poynter, to the portraits of Millais, Holl, and Ouless, to the classical scenes of Alma Tadema, to the brilliantly painted dramatic scenes, historical or domestic, of Orchardson, to the animal-painting of Briton Riviere, to the landscapes and cattle-pieces of Davis, to the landscapes of Alfred Hunt and Alfred Parsons; and, in another scale and key, to the noble ideal pictures of Watts, to the exquisite archaisms of Burne-Jones, and to the portraits of the younger Richmond. These painters have now established themselves beyond cavil or question; as have such workers in water-colours as North and Albert Goodwin, as Mrs.

[1] Comyns Carr, *Essays on Art*, p. 214.

Allingham and Sir James Linton. What is not yet so established, though it is a sign of the times that is full of interest, is the growth that may be observed of a school of younger men on whom the Parisian *atelier* and the landscape-painting of Corot and Rousseau have cast a powerful spell. The exhibitions of the transformed 'Society of British Artists' and of the 'New English Art Club' are as yet the special homes of this influence; but no exhibition of the Academy, or even of the Grosvenor Gallery—which after its opening in 1870 was for many years devoted to the cause of Mr. Burne-Jones and his followers—is now without striking examples of it. How far it will go, and what will be its permanent effect upon English art, none can say. As yet it shows itself chiefly in three things: in the cultivation of extreme technical dexterity, in an avoidance of 'prettiness' which threatens sometimes to develop into a horror of beauty, and in a preference of the whole to the parts—of the total 'impression' to truth of detail.

Sculpture.

Of all forms of art that which was in the most deplorable condition at the time of the Queen's accession was sculpture. Two or three men of talent were working: Sir Francis Chantrey had five years to live; Edward Hodges Baily, a pupil of Flaxman, was fifty years of age; and John Gibson, if we are to claim any credit for a man who lived more than half his life at Rome, was producing graceful groups and figures in the manner of Canova. Besides these there was scarcely a man who either in theory or practice showed the least understanding of the capacities of what is perhaps the noblest of the arts. It would be to go beyond the permissible limits of this chapter if we were to enter upon a discussion of the cause of that hopeless state into which English sculpture had fallen, or, to state the matter with perhaps more accuracy, of the reasons why sculpture had never risen in this country above a condition

for which mediocrity would be too good a name. For the great works of sculpture there can indeed never be a large demand in England. Rain, fog, and coal-smoke are a sentence of ruin to out-of-door sculpture in London, and no city where out-of-door sculpture cannot be favourably seen and judged offers a fair field to this difficult and delicate art. But we have our limited opportunities, and that even these are enough to develop a healthy and a fairly flourishing school, assuming the existence of training for the artists and a moderate amount of educated intelligence in the public, is proved by the state of sculpture now as compared with what it was fifty years ago.

Foley. When the history of Victorian art comes to be written at length, a large space will have to be assigned to the work of John Henry Foley. He was born in Dublin in 1818, but was of English race; his training was received first at the schools of the Royal Dublin Society, and then at those of the Royal Academy. In 1840 he exhibited the group, 'Ino and Bacchus,' which attracted much attention and brought him commissions; also his portrait busts and statues, of which that of Hampden was the first, revealed an intelligence of the sculptor's art which until then had been unknown in England. Foley seemed to be able to throw off instinctively the shackles of convention, and, while retaining a true artistic feeling for the ideal elements in character, he succeeded in coming close to life. His greatest works are the equestrian statue of Sir James Outram at Calcutta—the very model of what such a statue should be—and Sidney Herbert, in front of the War Office, one of the few London statues which will stand comparison with the great works with which the sculptors of France have adorned the streets of their capital. Foley had, as was natural, very considerable influence. He did not die till 1874, and long before that time a generation had arisen capable of appreciating

him and of providing him with worthy pupils and followers.

Another, and perhaps a greater, man whose name will be identified with the sculpture of the Queen's reign was Alfred Stevens, the maker of that magnificent Wellington memorial which, after a lamentable official history, is now hidden away in a side chapel of St. Paul's. Stevens was a profound student of the Italian sculptors of the Renaissance, but he interpreted their work with a modernness of spirit and with an intelligence of the conditions of modern life which entitles him to be regarded as their equal and not their imitator. The story of his great work is discreditable to the nation; he was worried, hindered, and starved by officials who neither knew how great a man he was nor how difficult and, of necessity, costly such a work should be. Fortunately, however, it was practically finished before the sculptor died; and, though it is placed in the position which says little for the artistic feeling of those in authority, there it is, the greatest work of architectural sculpture that this country has ever produced, and perhaps the greatest that has been produced in Europe since the sixteenth century. Alfred Stevens.

Of the sculptors who are now working in England, at least eight or ten are men of high distinction. Of the older generation we have Mr. Boehm, justly the most popular sculptor of the day, whose statue of Carlyle (now on the Chelsea Embankment) is worthy of its subject; we have Mr. Woolner, who began life as one of the Pre-Raphaelite Brotherhood, and who has always retained that combination of dignified poetical feeling with refined manipulation which marked his early work; we have Mr. Armstead, learned and accomplished; and we have the President of the Royal Academy, who is sculptor as well as painter. Younger than these are Mr. Brock, a pupil of Foley's, and a whole group Sculptors.

of men, the product of the combined influence of the sculpture of the Renaissance and of modern Paris. Of these Mr. Hamo Thornycroft has been longest before the world; his classical statues, the marble 'Artemis' and the bronze 'Teucer' first won him public and official recognition, and he has repeated those successes in a different field—in the pair of life-sized statues, 'The Mower' and 'The Sower,' which represent types of English rural life with the veracity, and with more than the grace, of Millet. An artist whose success is still more recent is Mr. Alfred Gilbert, the last elected Associate of the Academy. Unlike most of the young sculptors of the day, he worked for several years in Rome; but the influences that formed him were very different from those which had formed Gibson and the men of his generation. Mr. Gilbert is far removed indeed from the prettiness of Canova: he is a true child of the Renaissance; he deals with classic story, with Northern fairy tale, or with modern reality in the spirit, and with something of the strength, of Michael Angelo. Mr. Onslow Ford, Mr. Stirling Lee, Mr. Havard Thomas, and some other men rapidly coming to the front, have been more affected by French influence; and the youngest of all, Mr. Harry Bates, has, under the teaching of our own Academy Schools, fostered a love for the best Greek types in a manner full of promise for his future.

Architecture.

No branch of art has shown greater activity during the reign of Queen Victoria than architecture, and none, it may be added, displays more unquestionable improvement. We cannot indeed say even now that England possesses a national architectural style, but she is coming nearer to it than has been the case for many generations. We have had in this country great architectural periods: in church building the periods from the thirteenth century to the days of the triumph of the so-called Perpendicular style; in

domestic architecture the Tudor period; in the architecture of great public buildings in the days when Inigo Jones and Christopher Wren produced their works of genius; and again in the region of domestic architecture during the period when the influence of Wren was crossed by the influence of Holland and Flanders and produced those houses which are now vulgarly known by the name of Queen Anne. But at the time of the accession of Queen Victoria the national architecture was a chaos. The models that had come down to us from the Renaissance had been degraded and abused; Gothic architecture was misunderstood, and the imitation of Greek architecture, which had been in vogue for some short time, had been found to be monotonous and not easily adaptable to the daily uses of life. The early period of the Queen's reign was the period *par excellence* of the Gothic revival. The two Pugins by their practical achievements, and Rickman and others by their writings, brought about the first indispensable condition of such a revival; they showed people what Gothic architecture really was, and that it was something very different from what Horace Walpole had imagined it to be. The younger Pugin, says a distinguished modern architect, must be regarded as the real reviver of Gothic, and 'his best work, notably St. Augustine's at Ramsgate, possesses more of the essential elements of Gothic than much that has been based on larger experience and fuller knowledge.'[1] The seed sown by Pugin fell upon ground that had been well prepared; or, to change the metaphor, his work was but one symptom of the general revolutionary fever through which the most active and eager minds were passing at the moment. As has been said a thousand times, we have to regard the Tractarian movement, the Romantic movement in literature, and the Gothic movement in architecture as

The Gothic revival.

[1] Basil Champneys, *Art Journal*, June 1887.

so many branches of the same tree, as the common results of a discontent with stagnation, convention, and corruption, and of a general desire to find in the history of a purer and a simpler time a remedy for the evils and imperfections of the present. With the wider aspects of that movement we are not here concerned. Let it suffice to say that in architecture it had the plain and simple result of sending a number of intelligent students back to the original authorities, of leading men to travel, to draw, and to investigate, and, as a consequence, to substitute for the strange jumble which passed for Gothic in the early years of the century the learned and careful reproductions of Street and Gilbert Scott.

Charles Barry.

Even during the first half of the reign, however, Gothic architecture did not have it all its own way. The leading architect of the day, if we may give that title to Sir Charles Barry, produced indeed his chief building, the new Houses of Parliament, in a late and highly decorated Gothic style, but his real genius lay much more in the direction of Italian architecture. In 1832 he had built the Travellers' Club in Pall Mall, which internally at least impressed both learned and unlearned as an admirable and a beautiful building. He repeated this success on various later occasions, his masterpiece in this style being Bridgewater House. But though the Renaissance thus held its ground for public and private palaces, no one after Pugin ventured to build a church that did not express one or other type of Gothic. It is scarcely necessary even to indicate the mass of work of this kind that has marked the Queen's reign, a period which has had no rival in modern times for its activity in church building, and in which the various religious bodies have seemed to strive against one another for this end. The best known name in the architecture of the reign is that of Sir Gilbert Scott, who, both as a builder of churches

and as the official restorer of cathedrals, has left his mark more widely than any other man. He was a learned student of Gothic forms, but accuracy in him overpowered originality. His original work has too much the air of a copy of some type bequeathed by a far-off century, and in his restorations he was deficient in that sense of historical development which no man who has authority over an ancient building ought to be without. The second great Gothic architect of the reign was Mr. G. E. Street, the designer of a multitude of churches and of those Law Courts which are more satisfactory to lovers of the picturesque than to the lawyers and suitors who have to use them. Mr. Street, however, was a man of far more versatile mind than Sir Gilbert Scott, and, as his books show, his real interest lay rather with the Italian and Spanish forms of Gothic than with the Northern forms; while Mr. Burges, one of the most inventive of modern architects and designers, was as strongly influenced by the forms of French Gothic. Among the distinguished architects with Gothic predilections who are still working amongst us, it may suffice to mention Mr. J. L. Pearson, the architect of Truro Cathedral and of several churches in London and elsewhere; Mr. Alfred Waterhouse, the architect of the Manchester Town Hall, of the Natural History Museum, and of a very large number of other public buildings; Mr. Bodley, who has built the exquisite church at Hoarcross, the new buildings at Magdalen College, Oxford, and several other buildings of the highest excellence; Mr. Butterfield, the architect of Keble College, and of All Saints, Margaret Street; and if late Jacobean is to be included, Mr. T. G. Jackson, the builder of the new Examination Schools at Oxford.

Gilbert Scott.

Street.

Even in church architecture Gothic has thus by no means remained at the point where Sir Gilbert Scott left

it. He and his immediate predecessors did an indispensable work; they showed what were the principles on which the old architects had proceeded. But if Gothic was to be naturalised again in this country, it was equally indispensable that it should not rest in the condition of a mere echo or repetition of the past. The men whom we have just named are among the chiefs of those who have shown that Gothic architecture, at least in ecclesiastical and collegiate buildings, is capable of being developed and adapted to the uses of modern England. Still more remarkable has been the development which recent years have witnessed in domestic architecture. Here, too, the Gothic revival had a powerful effect, and for many years, and in many parts of the country, architects trained in the school of Pugin, or of Mr. Ruskin, did their best to house nineteenth-century English families in dwellings where the windows and the gables were suggested by Chartres, or Nuremberg, or Venice. The result was hardly satisfactory, and it is as much to the inconvenience of ultra-Gothic modern houses as to any other cause that we have to attribute the despairing dulness of the ordinary domestic town architecture of thirty and twenty years ago. People saw that it was impracticable to build modern streets after the fashion of the thirteenth century, and they took refuge in the sombre stupidity which is embodied in the streets of South Kensington. It is said to have been Mr. Philip Webb who first showed what might be made out of a combination of some Gothic elements with what has been called the vernacular style of the early eighteenth century. 'He boldly adopted,' says Mr. Basil Champneys, 'the mode of fenestration of this style, which he endeavoured to combine with Gothic construction and with a free and picturesque character of gable and chimney.' Mr. Webb is less known to the general public than another archi-

Domestic architecture.

tect of very original talent, Mr. Norman Shaw, who has done so much to make this admirable new architecture popular. Of Mr. Shaw's work it is enough to mention several of the houses on the Chelsea Embankment, the Albert Hall Mansions, and the offices of the Alliance Insurance Company at the bottom of St. James's Street. With his name and Mr. Webb's may be grouped those of Mr. Champneys, Mr. J. J. Stevenson (the author of a well-known treatise on domestic architecture), and Mr. Ernest George, who in different ways, and each with his own individuality of manner, have combined to form a school of domestic architecture interesting, convenient, and beautiful.

'Black and white.'

A volume would scarcely suffice to tell the story of the artists who have worked in what is called black and white during these fifty years, whether as designers or as engravers and etchers, or as both. Sir John Millais, in a recent speech to the students of an art school, pointed to the excellence and abundance of book illustration as one of the artistic features of our day; and he might fairly have extended his observation to the works in black and white that are produced not for books, but for the decoration of the house. Never has there been such an abundance of good work done in those directions as is being done at the present moment in England, in America, and in France. This is not the same thing as saying that our best men in all these departments are equal to the best men of the past. We have admirable mezzotint engravers, but none of them has yet quite equalled the masterpieces of Dickinson and John Raphael Smith; we have no longer the brilliant school of line engraving which existed when Brandard and Willmore rendered the pictures of Turner with such unrivalled delicacy of hand; we have etchers without number, but hardly a Rembrandt or a Hollar. In

this, as in many other departments of art, what distinguishes this age above all others is the combination of good workmanship and abundant quantity. Everybody seems to want some kind of art work, and the supply is at hand for everybody.

Book illustration.

The list of distinguished artists who have illustrated books during the reign, or who have worked for that which so much distinguishes our time, the illustrated press, is a long one, and we must be content to mention but a few of the names it contains. For some years after the Queen's accession Turner continued to do occasional work for the publishers; such as his beautiful illustrations to Whitaker's 'History of Richmondshire,' for example. Where he led others followed, and for a dozen years after 1837 it was the fashion for publishers to illustrate 'Landscape Annuals' and other works with steel engravings after artists good and indifferent. But the book illustrations most worthy of notice at this period are of a different kind; they are the illustrations which showed English art in an aspect for which it has ever since Hogarth's day been celebrated. Humorous design, passing sometimes into tragedy and sometimes into farce, found its exponents in a whole series of artists—George Cruikshank, Richard Doyle, Hablot Browne, John Leech, Thackeray, and many more, down to the men who continue to delight us week after week and Christmas after Christmas. Cruikshank was forty-five years of age in 1837, and had been indefatigably working since his boyhood. To an earlier generation he had been known as one of the most effective defenders of Queen Caroline; to the generation then living he was to become still better known as the illustrator of 'Sketches by Boz, 'Oliver Twist,' of the 'Miser's Daughter,' and 'Old St. Paul's.' Cruikshank has now taken his place, it would seem permanently, among the British illustrators of books whose

Cruikshank.

work is prized for its own sake, and 'Cruikshankiana' have become a recognised department of the collector's activity. His independence of mind, his wealth of quaint fancy, his power of realising the grim and terrible, have secured this place for him, though his career was so long and his work so superabundant that a distinction has to be drawn between what he did in his prime and what he did before and after. Hablot Browne, who worked under the name of 'Phiz,' was at one time Cruikshank's rival in popularity; but though we owe to him the illustrations of a great number of the works of Dickens, including all but the early chapters of 'Pickwick,' regard for the creator of the types of Sam Weller and Mrs. Gamp must not induce us to place 'Phiz' as an artist higher than the second or third rank. A higher place is claimed by the charming talent of Richard Doyle, 'Court Painter to the Queen of the Fairies,' as he has been called. He it was that designed the cover of *Punch*; and in fanciful illustration of the sort, filled with the floating or dancing forms of fairyland, his talent continued to the end to find its happiest exercise. But during the first ten years of Mr. Punch's career Doyle worked assiduously in another direction, employing his ever-varying humour and his quick pencil in delineating in his own charming fashion the 'Manners and Customs of y^e^ Englyshe,' whether in the series of drawings so entitled or in other ways. Sometimes he consented to illustrate other people's books—Thackeray's 'Newcomes,' for example, and Ruskin's 'King of the Golden River'; while, as we were reminded when his works came to be sold after his death, his hand was at other times busy with exuberant inventions of his own, illustrating either the world of men or the world of fairies. John Leech was a few years older than Doyle, and for a considerable time was his colleague on the staff of *Punch*. There for twenty-three years, from 1841 to the time of his death

'Phiz.'

Richard Doyle.

Leech.

in 1864, he produced week after week those delightful sketches of contemporary life, humorous, full of character, and based upon the minutest observation, but always genial, kindly, and pure, which gave him a place not only in the art history of the time, but in the affections of his contemporaries. Of other artists who have passed away it is only necessary to mention under this heading the names of Frederick Walker, G. J. Pinwell, and Randolph Caldecott. Of the general work and influence of Walker we have already spoken, but Caldecott, who died at an early age in 1886, worked almost entirely for the engraver, though the great improvement recently made in colour-printing enabled him to publish his charming designs in the colours in which he drew them. His especial talent lay in restoring for us the quainter elements of the England of our great-grandfathers, especially of rural England, with its humours of the hall and the hunting-field. These and cognate subjects Caldecott drew with the eye and hand of a thorough artist, and with a genial sympathy with which no one was so richly endowed as he.

Caldecott.

Living artists.

The activity of living artists in the illustration of books and periodicals is unbounded. Sir John Millais, indeed, has now ceased to draw for the engraver, but twenty-five or thirty years ago he produced many drawings for *Once a Week*, *Good Words*, some of the novels of Trollope, &c., which, with the work of Frederick Walker, contributed not a little to the general improvement of book illustration. *Punch* continues to delight us weekly with the nobly drawn cartoons of Tenniel; with the admirable, if sometimes too elaborate, scenes from the pencils of Du Maurier, who has established a unique position as the chronicler of the foibles of 'society;' with the strong and masterly sketches of Charles Keene, with the brilliantly fanciful vagaries of Linley Sambourne, and with the rollicking fun of Harry

Furniss. In other illustrated papers a whole school of artists are at work, among whom two of the most vigorous are Mr. Caton Woodville and Mr. Frederick Barnard. Men like Mr. Edwin Abbey—a young American settled among us—show by their monthly contributions to the magazines what a wealth of artistic ability is now lavished upon illustration; and as Christmas comes round, the children, not only of the United Kingdom, but of the Continent and of America, are constantly delighted with the entrancing quaintnesses of Miss Kate Greenaway and the classico-mediæval fancies of Mr. Walter Crane.

Engraving.

If this is the state of the case with regard to the draughtsmen and designers, much might also be said on the subject of the engravers, and of the history of the various methods of reproduction which have found favour with the public during our time. While every kind of legitimate engraving, using the word which includes etching, has flourished at different periods of the Queen's reign, that reign has been marked off from all previous ages by the invention and development of the new art of photography. To this we may return presently, but meantime a word must be said about engraving in the more lawful sense of the term. Fifty years ago the mode that was most in favour was line engraving, as it was understood by the great school of landscape engravers that had grown up around Turner. Men like Pye, the two Brandards, Goodall, Cousen, and Willmore—many of whom, strange to say, learnt their exquisite art in the smoky atmosphere of Birmingham—had brought the manipulation of the burin and the steel plate to a degree of perfection which had never been witnessed before and which probably will never be witnessed again. They worked under Turner's eye in the reproduction of his 'Rivers of France,' his 'England and Wales,' his drawings which illustrated Scott and Rogers,

The line engravers.

and the rest; and in translating his water-colours, or his oil-pictures in the case of the larger plates, they rivalled the delicacy and the subtlety of the master himself. But it was impossible, unfortunately, that such work should long compete with broader and cheaper methods, and with the death of Turner it may be said that the line engraving of landscape almost disappeared. A few engravers, however, continued to work in line in the reproduction of subject pictures, especially George Doo, who lately died at a great age, and Lumb Stocks, his fellow-Academician, who still lives among us. Few of the works of this last class can be said to rival the productions of foreign engravers, such as Raphael Morghen and Desnoyers; but an Englishman expects better things when he turns to his countrymen's productions in mezzotint. Unfortunately, during the greater part of the reign, and in fact until within the last year or two, much of what has passed under this name has not been legitimate mezzotint at all, but a composite kind; and the rest, being printed from steel and not from copper; has been without the beautiful softness which characterises the works of the great English masters of the last century. The most distinguished worker in this field, the veteran Samuel Cousins, only died the other day at the great age of eighty-six, having continued almost to the date of his death a career of active work which began when he was a boy of thirteen. Cousins's finest plates date from long before the Queen's accession, but there is still a great demand for proofs of his many works after Landseer, and of those interesting productions of his old age which, beginning with 'The Strawberry Girl,' did so much to foster the revived passion for the works of Sir Joshua. Very recently a few young men have risen among us with the power and the will to work the old mezzotint method exactly in the manner in which it was worked a century ago.

Mezzotint.

Samuel Cousins.

They have found here and there a publisher who does not shrink before the prospect of limiting the issue of a plate, and by working on the copper according to the plan of the Watsons and Valentine Green they are beginning to produce engravings which will bear comparison with those of the old engravers.

Revival of etching.

But the most remarkable feature of the time with regard to the development of what are commonly called the graphic arts is undoubtedly the recent revival of etching. Even thirty years ago this beautiful art can hardly be said to have existed in England. Now the print-shops are full of its productions; there is a whole flourishing society of painter-etchers—that is to say, of etchers who invent their own subjects; while of the men who use the etching-needle to reproduce the compositions of others, the name is legion. The causes of this change are manifold, but a few may be specially mentioned. The publications of the Etching Club from 1844 onwards interested only a small class, and cannot be said to have contributed much to the popularity of etching. It was in France that the revival had its origin, expressing itself first in the admiration felt by artists for the genius of Charles Méryon. The etchers who may be said to have first transplanted the newly revived art in its most admirable form to English ground were Mr. Seymour Haden and Mr. Whistler, the former of whom issued a series of plates in 1866; and then came Mr. Hamerton's book 'Etching and Etchers,' and the founding of the periodical called *The Portfolio*. These two publications did much to introduce to the notice of English amateurs the works of the new school of French *aquafortistes*, and to stimulate the efforts of English artists in the same direction. In a short time the names of Rajon, Bracquemond, and Waltner, of Chauvel and Brunet-Debaines, took in the estimation of English collectors the place of Toschi and Desnoyers; and all the young English artists began to etch.

For original work we have nothing that has surpasssed the achievements of the two men named above; but in the department of etching, which is occupied with the translation of pictures into black and white, the primacy, as far as this country is concerned, seems to have been secured by Mr. R. W. Macbeth. His large plates after the works of Frederick Walker, Mason, and Pinwell have met with very great success, and have had the indirect effect of renewing and perpetuating the influence exercised by that interesting group of painters.

Photography and art.

It remains to say something about the effect of photography upon art. There are indeed other aspects in which the bearings of the new discovery have been of the greatest importance; for on the social side photography has done much to preserve the sense of kinship among the scattered members of English families all over the world; and on the scientific side it has done much, and is annually doing more, in the way of recording phenomena that are sometimes invisible to the human eye. It has had, moreover, a special bearing upon art. At first, when in the year 1839 Daguerre introduced the daguerrotype, and Fox Talbot the chloride of silver process, the modern developments of photography were as little suspected as those infant processes themselves had been expected twenty years before. Now by successive improvements the methods of photography itself have reached the most marvellous perfection; and, as one consequence, miniature painting is almost a lost art among us. But what is most interesting to us at the present moment is the series of adaptations of photography that have lately been made for the purpose of reproducing works of art. It would require a technical treatise to explain the various methods in which photography is now pressed into this service—methods the very names of which are a terror to all who value some kind of purity in language. Albertype, heliotype, collotype, photoglpytic,

stannotype—these are various titles under which some of the processes for combining photography with engraving are now known, while autotype is a term now appropriated to the system of carbon-printing, which in the hands of the Autotype Company has become so popular. The others may be generally described as methods by which a gelatine plate with the picture photographed upon it is made to take the place of an ordinary lithographic plate; and from this mere description it may be guessed how greatly the work of reproducing pictures is cheapened by such a method. More difficult and costly is the process known as photogravure, cheaper forms of which are now coming into use under the names of klicotype, photo-aquatint, &c. Photogravure is a process partly mechanical; but in it, after the photographer has done his work, the aid of the skilled engraver has to be called in, and the plate to be worked upon by a careful hand. It is after this last process has been gone through that those wonderful photogravures are produced which have of late years been so seriously threatening the existence of the mezzotint engraver.

General artistic advance.

At the beginning of this chapter we hesitated to say whether the record of the art of fifty years was a record of progress or not. It can hardly, however, be seriously doubted that the advance has been a real one; that the popular understanding of art is at least somewhat greater than it was; that our artists know more and do better than their fathers before them. Each senior Academician will confess that work which in his youth would have won a medal at the Academy Schools will not now do much more than secure admission for a student. Each of the public exhibitions which, not only in the month of May but all the year through, abound in London, displays a quantity of work which at least shows that those who have produced it have learnt their grammar; and the foreigner who now enters

an English gallery is not perpetually shocked by those solecisms in drawing and composition which made him wonder a generation or two ago whether art could ever exist in England outside the works of one or two men of genius. Our portrait-painters are the equals of any in Europe; nay, it would be difficult to find, even among the great portraits of the past, any that have for vigour and veracity surpassed the best works of Millais and Holl. For the rest, we cultivate—as is our national wont—a score of styles; we decline to be bound by one set of traditions, or to be moved by any single influence, and the same gallery which contains the dramas of Orchardson and the brilliant *technique* of Alma Tadema contains also the noble visions of Watts, and those shining illustrations of a world that is not ours by which Mr. Burne-Jones has conquered the admiration of his age. We have never had sculptors so many or so good as now. We have never shown such a combination of originality and learning in architecture. In the lesser arts of life—though these, in proportion as they depend on the favour of the many, are especially liable to the national vice of vulgarity—the progress that the last half-century has seen has been simply astonishing, and the mode of house-decoration which twenty years ago would have marked a man out as affected and eccentric is now recognised, by the public that claims to be educated, as the expression of a rational taste. In a word, art has kept pace with the growth of knowledge. Upon the literature of art in all its forms immense research has been expended, and, by means of exhibitions and the popular press, what was formerly only known to a few experts or not known at all is now so accessible 'that he may run that readeth.' If art ever had a chance in the history of the world, it has it now. We cannot call genius into existence, but at least it may be said that, whenever artistic genius chances to arise in modern England, it will find its fit environment.

THE DRAMA.

Patent theatres and 'minor houses' in 1837.

WHEN Queen Victoria came to the throne in 1837 the English stage was still subject to the monopolies established at the Restoration. The Patent Theatres, Drury Lane and Covent Garden, asserted the sole right to perform what was called the legitimate drama, though the Haymarket shared this privilege during the summer months. As a matter of fact, the monopoly did not rest upon the patents granted to Killigrew and Davenant at the Restoration, but rather upon the Lord Chamberlain's habit of enforcing, under Walpole's Act of 1737, the long prescription enjoyed by the old theatres. Walpole's Act gave his lordship the right to license playhouses within the liberties of Westminster, and under it he licensed the Haymarket for 'the legitimate,' the Lyceum and the St. James's for musical performances, and the Olympic and Adelphi for 'burlettas,' defined (by anyone rash enough to attempt a definition) as plays containing 'not less than five pieces of vocal music in each act.' All other metropolitan theatres were actually illegal. The local magistrates could grant only music and dancing licenses, which might cover ballets, pantomimes, and equestrian performances, but could not possibly extend to dramatic representations. Accordingly, Astley's, the Surrey, the Victoria (formerly the Coburg), Sadler's Wells, the Queen's Theatre in Tottenham Street, and the City of London, the Pavilion, and the Garrick Theatres in the East End, all existed on

Illegal theatres.

sufferance, and adopted absurd subterfuges—such as keeping a piano tinkling throughout every performance—in the attempt to legalise their position. I should add that the Strand Theatre, within the Lord Chamberlain's domain, was carried on in flagrant defiance of his authority. During the ten years between 1830 and 1840, the injustice of this chaotic state of matters was rapidly becoming unbearable. The Patent Theatres played the dog in the manger, suffering the legitimate drama to moulder on the shelf while they relied upon melodramas and 'tame wild beasts,' yet loudly asserting their privileges whenever the minor houses attempted to trespass on the legitimate domain. 'At present,' writes F. G. Tomlins in 1840, 'three theatres alone can perform any of the productions of our fine regular drama, while the whole sixteen may perform *Jack Sheppard*.' A Parliamentary committee which sat in 1832 probed these absurdities to the bottom, and reported strongly against the monopoly system; but theatrical free trade was not established until 1843, by an Act which at the same time gave to the Lord Chamberlain the power of licensing theatres practically throughout the metropolitan district, and unfortunately confirmed the right of censorship vested in him by Walpole's Act. It is by this Act, to all intents and purposes, that the theatres are to this day governed.

6 & 7 Vict. cap. 68.

Population and playhouses—then and now.

We thus find that in or about 1837 London, with a population of less than 2,000,000, possessed sixteen theatres, or seventeen if we count the Italian Opera House. In 1887 the population and the theatres are both approximately doubled in number. It should be added that a swarm of large and showy music-halls—the flaunting offspring of the humble 'cider-cellars' and 'coal-holes' of fifty years ago—now compete actively with the theatres, while classical and other concerts enjoy a vogue at that time undreamt of. In spite of all this competition, however, there can be no doubt

that the stage is to-day far more prosperous, financially speaking, than it was at the commencement of her Majesty's reign. Large fortunes are now made both by managers and actors; then, popular actors who had studiously refrained from dabbling in management would occasionally retire on a competence, but management was almost always disastrous. The Patent Theatres ruined lessee after lessee, and the minor houses, though they now and then enjoyed spells of good fortune, were seldom largely or continuously remunerative. Financially, then, free trade has more than justified itself; in other respects it has not, perhaps, worked all the wonders predicted by its champions.

So much for the legal status of the stage at the commencement of our period; let us now look more closely into its artistic condition.

Actors: The bygone generation.

In 1837 the Age of the Kembles had come to an end, and the reign of Macready was at its height. Twenty-five years had passed since Mrs. Siddons's retirement from the stage; twenty since John Philip Kemble's. It was five years since Charles Young's last appearance; and four since Edmund Kean, a pitiable wreck, had broken down at the phrase 'Othello's occupation's gone,' and had been led off the stage by his son Charles, then struggling into repute. Charles Kemble, youngest of the great family—an excellent Romeo, Mark Antony, and Faulconbridge—bade farewell to the stage in 1836, only a few months before the Queen's accession. Of the comedians, Munden, with his 'wonder-working face,' retired in 1824; the versatile and irrepressible Elliston died in 1831; the elder Mathews died in 1835; while Liston, the incomparable, remained on the stage until well on in 1837. At the head of his profession, as I have said, stood William Charles Macready. He first appeared in London in 1816, the year before John Kemble's

The active list of 1837: Tragedians.

retirement. Charles Kemble then remarked of him, 'That young man will be a great actor one of these days;' whereupon the great John Philip replied 'Con quel viso, Charles!' His visage was not the only difficulty with which he had to contend, and it was by sheer doggedness that he conquered his position. His method was eclectic, combining Kemble's long-drawn declamatory thunder with Kean's flashes of lightning. He redeemed his physical defects and mannerism by his great power, his irresistible tenderness, and a cultivated intelligence such as no other English actor, not even Garrick, has possessed. When the Queen came to the throne, he was planning his first managerial campaign at Covent Garden, which commenced in the autumn. Charles Kean was at this time in the provinces, gathering strength for a new and successful advance upon London in the following year. Next to Macready among 'legitimate' actors, but at a long distance, stood John Vandenhoff, James Wallack, and E. W. Elton. James Anderson made his first London appearance in 1836, Samuel Phelps in 1837. Early in 1836 Helen Faucit had sprung at one bound into fame, and now shared with Fanny Kemble, Ellen Tree, and Mrs. Warner the first position among serious actresses. Mrs. Glover and Mrs. Nisbett were at the height of their reputation. Mrs. Stirling had been four years on the stage, and was rapidly rising into note. Among the most popular comedians of the day were Mr. and Mrs. Keeley; Mr. and Mrs. Yates; Madame Vestris, who had passed the middle of her career, and Charles Mathews, whose life as an actor had barely commenced; Dowton, great as Sir Anthony and Dr. Cantwell; the low comedians Wright and Reeve, and the buffoon Paul Bedford; Benjamin Webster and Buckstone, both newly risen into fame; T. P. Cooke, the British Tar of the popular ideal; and the Irish actor, Tyrone Power, idolised but ill-starred. The depression of the drama was clearly

Comedians.

not to be attributed to any lack of individual talent in its interpreters.

Dramatic literature, on the other hand, was at a low ebb. The ghost of the romantic drama stalked the stage, decked out in threadbare frippery, and gibbering blank verse. No one had as yet reflected that though Shakespeare might be for all time, his forms and methods were evolved to suit the needs of an age quite different from ours. His marvellous vitality induced in actors a declamatory habit, and led the public to conceive an archaic and inflated jargon the necessary mark of serious drama. Whatever was least essential to Shakespeare's greatness was conscientiously imitated; his ease and flexibility of diction, his subtle characterisation, and his occasional mastery of construction were all ignored. Laboured rhetoric, whether serious or comic, was held to be the only 'legitimate' form of dramatic utterance. This was literature—all else was mere melodrama and farce. **Dramatic literature in 1837.**

Sheridan Knowles was the Shakespeare of 1837. *Virginius* had made him famous in 1820, and *The Hunchback*, in 1832, had placed him on the summit of popularity. Copious rhetoric, artificial but theatrically-telling humour, and a fine fluency of execrable verse, were the qualities which gained him his repute. He wrote worse at some times than at others, but I know of no scene in his sixteen plays that shows either dramatic inspiration or literary grace. A worthy follower of Knowles was G. W. Lovell, whose first play, *The Provost of Bruges*, was produced by Macready in 1836. His vigorous drama *Love's Sacrifice* still holds the provincial stage. In 1836, too, Talfourd and Bulwer made their maiden essays—*Ion*, and the unsuccessful *Duchesse de la Vallière*. Talfourd had poetic feeling and moral elevation, but his style was over ornate, and his construction feeble. He never repeated the unlooked- **Poetic playwrights.**

for success of *Ion*. Bulwer, by far the most modern playwright of his day and class, knew the value of action and situation. Had he known the value of sincerity in sentiment and sobriety in diction, his plays might have lived, not only on the stage, but in literature. The production of *Strafford* a few weeks before the Queen's accession placed 'Robert Browning, writer of plays,' on the list of stage poets. His neglect of action, his contempt for theatrical effect, and his excessive nimbleness of thought, with its concomitant jerkiness of elliptical expression, rendered it clear to Macready, as it must be to everyone who realises the unalterable conditions of the theatre, that his plays, with all their merits, could never be popular. The three which found their way to the stage seem all to have produced the same effect—interesting the few, bewildering the many. Of all the poetical plays of this period, Leigh Hunt's *Legend of Florence* is probably that in which dramatic and literary qualities are most happily blent. The character of Agolanti is drawn with a subtlety not unworthy of Browning; and the design of the piece, though it lacks vigour, is clear and graceful. Gerald Griffin's posthumous play *Gisippus* is the crude work of a young man, but shows power which culture might have developed. R. Zouch Troughton's *Nina Sforza*, on the other hand, lacks both power and skill. Westland Marston, whose career began in 1842 with *The Patrician's Daughter*, a work of unsound and inflated style, in time threw off the worst faults of the bombastic school, and might be called the Ponsard of his period were there any Victor Hugo to oppose to him. The unacted and unactable dramatists, who published their five-act tragedies with prefaces railing against the monopolist managers, are too numerous and insignificant to be mentioned. Henry Taylor, who published *Isaac Comnenus* in 1827, and the noble *Philip van Artevelde* in 1834, held wisely aloof from the

stage. Repose and distinction, not fire and energy, were his chief qualities, which were mirrored in his refined but rather sluggish verse. When Macready, towards the close of his career, placed a mutilated version of the first part of *Philip van Artevelde* on the stage, the experiment proved a failure. The dramatist who, amid all the pseudo-Shakespeareans, possessed by far the largest share of the true Elizabethan spirit, did not make his way to the stage at all. I mean R. H. Horne, whose *Cosmo de' Medici* belongs to 1837, and his *Death of Marlowe* to the following year.

The minor drama.

The lower drama (so-called) was less dull than the higher, but its literary merit was not great. Eight years had passed, in 1837, since Douglas Jerrold's *Black Eye'd Susan* set the fashion of nautical melodrama, which was still being busily purveyed for the minor houses. Jerrold himself was turning out light pieces by the dozen, full of witty dialogue, but slight in motive and conventional in structure. Planché had already written for Madame Vestris and others several of his graceful and witty extravaganzas, which are to their successors as Tenniels to Rowlandsons. He was also busily producing little comedies and dramas, for the most part, like himself, of French ancestry. Stirling Coyne, Maddison Morton, Charles Mathews, and John Oxenford were writing and adapting comedies, comediettas and farces by the score; while Buckstone, Bayle Bernard, and Fitzball dealt largely in melodramas as well. The prices of these productions ranged from 2*l.* or 3*l.* to 60*l.* or 70*l.* Buckstone, who was certainly as well paid as any writer of his class, seems never to have received more than 70*l.* for a three-act drama. It should be noted, too, that, until the Dramatic Authors Act of 1833, stage-right had no statutory protection, and that, even after the passing of that Act, little was to be got out of the country theatres, now so rich a source of revenue.

Three periods.

The Queen's reign may conveniently be divided into three periods: the Macready period, from 1837 to 1851; the Kean and Phelps period, from 1851 to 1865; and the modern, or Bancroft and Irving period, from 1865 to 1887. In the first of these periods the rhetorical drama, at which we have just been glancing, was still predominant; in the second, we had fallen more completely under the sway of France, and Tom Taylor and Dion Boucicault were our Scribe and D'Ennery; in the third, some of us venture to hope that we are gradually shaking off this foreign dominion, having profited in the meantime by the lessons it has taught us.

First period, 1837-51.

Macready at Covent Garden.

Macready's management at Covent Garden commenced September 30, 1837, and lasted until July 16, 1839. His company included Phelps, Vandenhoff, Anderson, Elton, G. Bennett, Meadows, and Bartley; Helen Faucit, Mrs. Warner, Mrs. Glover, and Priscilla Horton. In his two seasons he produced *A Winter's Tale*, *Hamlet*, *Macbeth*, *Othello*, *Lear*, *Coriolanus*, *Romeo and Juliet* (playing Friar Laurence), *As You Like It* (playing Jaques), *Julius Cæsar*, *Henry V.*, *Henry VIII.*, *Cymbeline*, and *The Tempest*. The principal non-Shakespearean productions were: *The Bridal* (a version of *The Maid's Tragedy*), *Venice Preserved*, *Werner*, *The Two Foscari*, *Virginius*, *William Tell*, *The Hunchback*, and *Ion*. In the first season two new plays met with great success: Knowles's *Woman's Wit*, and Bulwer's *Lady of Lyons*, which was produced without the author's name. It was acted thirty-three times during the first season, and twenty-nine times during the second, when its popularity was, if possible, surpassed by that of the same author's *Richelieu*. Most of the Shakespearean plays were 'revived'—a term ridiculed as pretentious by Macready's detractors—with an elaboration of scenery and

costumes which Bulwer described as 'at once gorgeous and severe.'

Some of the 'revivals' were highly successful. *The Tempest*, for instance, was played fifty-five times, to an average receipt of 230*l.*[1] a night. An influential clique of literary friends, including Bulwer, Talfourd, Browning, Dickens, and Forster gave Macready the heartiest support. Bulwer made him a free gift of *The Lady of Lyons*, and Stanfield, who painted a panorama for one of his pantomimes, returned half of the 300*l.* sent him in payment. Yet, with all this help, and with little effective opposition at Drury Lane, the undertaking resulted in loss, due mainly to the exorbitant rent demanded for the theatre. Macready's disappointment was solaced by a banquet, at which the Duke of Sussex presided, and Bulwer, Monckton Milnes, Dickens, Forster, and Lalor Sheil were present. Two years later Macready was again tempted into management, this time at Drury Lane, which he opened December 27, 1841. He 'protected' the auditorium from the 'improper intrusion' which had hitherto been a scandal to public decency, and on the stage he pursued the liberal tactics by which he had earned respect at Covent Garden. His company was much the same as before, with the addition of the Keeleys, Compton, Ryder, Mrs. Nisbett, and Mrs. Stirling. Again he managed to carry on for two seasons, and no more. He produced with special care, *The Merchant of Venice*, *The Two Gentlemen of Verona*, *As You Like It*, *Much Ado*, and *King John*, besides going through his usual repertory. His successful novelties were, Gerald Griffin's *Gisippus*, and Westland Marston's first play, *The Patrician's Daughter*. Knowles's *Secretary* and Browning's *Blot in the 'Scutcheon* were unsuccessful novelties, and a

and at Drury Lane.

[1] The prices were: Boxes, 5*s.*; pit, 2*s.* 6*d.*; lower gallery, 1*s.* 6*d.*; upper gallery, 1*s.*

careful revival of *Marino Faliero* produced little effect.[1] Despite some languid patronage from the Court, Macready found it impossible to 'bring the fashion' to the theatre, and his audiences, though sympathetic, were not numerous enough to enable him to bear the heavy burdens imposed on him. He retired from management June 14, 1843, making his last bow amid 'mad acclaim.' His comment in his diary is, 'I could have wept to think of all these efforts and expenditure come to nothing.'

Webster at the Haymarket.

Benjamin Webster's management at the Haymarket commenced June 12, 1837, some ten weeks before Macready's at Covent Garden. Macready himself was Webster's first star, and his second was Phelps, who made his first appearance in London, August 28, in the part of Shylock. The great success of the season was Knowles's *Love Chase*, in which Strickland, Elton and Webster, Mrs. Glover and Mrs. Nisbett took part. During the four following seasons —the Haymarket was still a summer theatre—Macready was the chief attraction, seconded, as a rule, by Miss Faucit, Mrs. Warner, Mrs. Glover and Phelps. Talfourd's *Athenian Captive* was the novelty of 1838; Bulwer's *Sea Captain* succeeded, in spite of ridicule, in 1839; in 1840 Talfourd's *Glencoe* and Bulwer's *Money* were produced; and in 1841 Troughton's *Nina Sforza*. *Money* was incomparably the greatest success of this period. Macready's Alfred Evelyn was 'amazingly bright and telling, the forced gaiety being as natural to the man as appropriate to the character.' Helen Faucit played Clara Douglas; Priscilla Horton, Georgina Vesey; Mrs. Glover, Lady Franklin; Webster, Graves; Walter Lacy, Sir Frederick Blount; Wrench, Dudley

[1] Whole operas, such as *La Sonnambula* and *Der Freyschütz*, were presented as after-pieces. *Acis and Galatea* and *Comus* were put on with great elaboration, and many farces and light comedies (such as Jerrold's *Prisoner of War*) were produced.

Smooth; and David Rees (a fine comedian, who died early) made a great impression as Stout. D'Orsay superintended the dresses, Charles Mathews having set the fashion of punctiliousness in modern costume on the stage. Charles Kean and Ellen Tree, who in 1842 became his wife, played several engagements under Webster's management, with varying fortune. Their chief successes were in Knowles's *Rose of Arragon* (1842), Lovell's *Wife's Secret* (1848), and Westland Marston's *Strathmore* (1849). Madame Vestris and Charles Mathews, in the interval between their Covent Garden and their Lyceum managements, appeared frequently at the Haymarket. It was here that they produced *Used Up* and Jerrold's *Time Works Wonders*. Planché, too, was for several seasons attached to the theatre, producing, among other things, *The Golden Fleece*, with Madame Vestris as Medea and Mathews as the Chorus; an adaptation of *The Birds* of Aristophanes; and a most successful arrangement of *The Taming of the Shrew*, after the manner of the Elizabethan stage, with Strickland as Christopher Sly, Mrs. Nisbett as Katharina, Webster as Petruchio, and Buckstone as Grumio. For the rest, the theatre subsisted largely upon Buckstonian farces and comic dramas, most of them freely borrowed from the French, and upon revivals of English classic comedy. The bill was often inordinately long, two five-act comedies, or a farce, a tragedy, and a three-act comedy, being quite a moderate evening's entertainment. When Mr. J. L. Toole made his first appearance (July 22, 1852) the performance was not over until two in the morning. This year was further notable for the first appearance of Mr. Barry Sullivan (as Hamlet), and the production of *Masks and Faces*, by Charles Reade and Tom Taylor, in which Webster played Triplet, and Mrs. Stirling Peg Woffington. In the following year (March 14, 1853) Webster's management came to an end,

and Buckstone reigned in his stead. In his farewell speech Webster stated that, in the sixteen years of his management, he had paid to authors nearly 30,000*l.*—by no means a large sum according to the present scale of dramatic values.

Mathews and Vestris at the Olympic,

On Macready's retirement from Covent Garden in 1839, Madame Vestris and her husband, Charles Mathews, were tempted away from the little Olympic where, since 1831, 'the genius of gentility had presided.' 'Madame' was the first manageress on the English stage, and under her reign, says F. G. Tomlins, 'one-act farces, satirising solecisms in gentility and violations of elegance; two-act vaudevilles, with French sentiment and Spanish intrigue; mythological and semi-poetical pieces [by Planché], adapted to the display of voluptuous forms and captivating action, were the stock productions.' At Covent Garden more solid elements were necessarily added to this bill of fare. Shakespearean comedy was a favourite dish. The management opened, September 30, 1839, with *Love's Labour's Lost*; and, in the course of its three seasons, the *Merry Wives* was acted forty-five times, *A Midsummer Night's Dream* sixty times, while other classic comedies, from Shakespeare to Sheridan, were frequently performed. Of new plays the most noteworthy were Leigh Hunt's *Legend of Florence*, a success of esteem; Knowles's *Love*, a great success; and, greatest success of all, the first work of a young writer named Mr. Dion Boucicault, the now famous *London Assurance*. Planché, faithful to the Vestris standard, acted as 'Superintendent of the Decorative Department,' and produced several bright extravaganzas; while light pieces of the Olympic school, new and old, French and English, were always in the bill. The result is thus summed up by Mathews: 'The first season was—sowing; the second—hoeing; the third—owing;' or, in other words, bankruptcy, with debts to the amount of 30,000*l.* Nothing daunted, however, the buoyant pair soon

at Covent Garden,

made another venture. They took the Lyceum, hitherto an ill-starred house, and from October 18, 1847, until March 24, 1855, they carried on the management, battling with ever-increasing difficulties. They relied chiefly upon light pieces freely adapted from the French, often by Mathews himself. G. H. Lewes's *Game of Speculation* (*Mercadet*) may stand as an example of their more serious efforts, while *Box and Cox* remains an immortal type of the farce of the period. Planché's extravaganzas, too, with William Beverley's scenery, were very popular; but nothing availed to stem the tide of disaster. Mathews again became bankrupt, and the death of his wife—'the best actress that ever sang, and decidedly the best singer that ever acted'—followed a year later. and at the Lyceum.

The Adelphi, during the opening years of the Queen's reign, was under the management of Frederick Yates, 'the English Lemaître,' who placed his chief reliance upon hot-and-hot adaptations of Dickens's novels, then in the first flush of popularity; upon Irish drama, with Tyrone Power; nautical drama, with T. P. Cooke; and melodramas and farces of the Buckstonian type, of which *Jack Sheppard* was one of the most famous. Yates himself, his wife, Mrs. Keeley, O. Smith, Wright, Paul Bedford, and, occasionally, Buckstone were the leading members of the company. On her husband's death in 1842, Mrs. Yates assumed the management, until, in 1844, Webster became lessee, and Madame Celeste, 'the gazelle-eyed Celeste,' queen of melodrama, acted as 'directress.' She continued the Yates policy with success, Buckstone's *Green Bushes* and *Flowers of the Forest*, and Webster's *Belphegor* being legendary triumphs of her reign. On Webster's retirement from the Haymarket in 1853 he joined Madame Celeste at the Adelphi, of which he retained the management for over twenty years. The Adelphi.

The Princess's Theatre, first opened with promenade

The Princess's.

concerts in 1840, was devoted to dramatic performances, under the management of J. M. Maddox, from December, 1842, onwards. Opera and burlesque were at first the staple fare, but between 1844 and 1850 Macready, James Wallack, Edwin Forrest, Miss Cushman, Mathews and Madame Vestris, Mrs. Stirling, Fanny Kemble (Mrs. Butler), Creswick, Mrs. Warner, Compton, and Oxberry appeared from time to time on its boards. Here Macready, in 1846, produced with some success *The King of the Commons*, by the Rev. James White, and in the following year the arrangement of *Philip van Artevelde* mentioned above. Maddox was a man of small talent for management, and in 1850 he transferred the theatre to Charles Kean, whose management forms the leading feature of our next period.

Macready's retirement.

But we have yet to take leave of Macready. So early as 1849 he commenced a desultory series of farewell performances at the Haymarket, where he last appeared as King Lear, February 3, 1851. Drury Lane, however, was naturally chosen as the scene of his final farewell. Since he left it, in 1843, the great theatre had undergone the management of Bunn and of M. Jullien, the promenade-concert impresario, who excited a storm of patriotic indignation by venturing to introduce a French company in *Monte-Cristo*. It had now passed into the hands of James Anderson. At Drury Lane, then, on February 26, 1851, Macready made his last appearance on the stage, playing Macbeth, as he tells us, with 'a reality, a vigour, a truth, a dignity,' he never before attained. His parting address was brief and dignified, and the fervour of the crowded theatre was intense. He was probably right in saying that up to that time 'no actor had ever received such testimony of respect and regard in this country.' The inevitable public dinner followed, Sir E. L. Bulwer in the chair; and then the strenuous, thoughtful, and richly-endowed actor,

the morose and self-torturing, but upright and warm-hearted man, withdrew into the privacy in which the remaining twenty-two years of his life were spent.

Second period, 1850–65.

To trace the history of our second period we must go back some way into our first. No sooner had free trade in the drama been established by the Act of 1843, than Samuel Phelps and Mrs. Warner determined to shake off 'the yoke of inauspicious stars' at the Patent Theatres, and establish a playhouse of their own. They chose Sadler's Wells, an old suburban theatre which had fallen into sad disrepute, as the scene of their operations. Securing an active business partner in T. L. Greenwood, they opened their campaign, May 27, 1844, with *Macbeth*. It is said that they originally intended to rely upon melodrama, and that Shakespeare was a mere afterthought. Be this as it may, he proved the right man in the right place, and for eighteen consecutive seasons the standard of 'the legitimate drama' waved over merry Islington. In 1846, Mrs. Warner retired from the management, and Greenwood in 1860; but until March 15, 1862, Phelps maintained this most gallant battle in English theatrical history, indomitably snatching success out of the very jaws of failure. In these eighteen seasons he produced thirty-one out of the thirty-seven plays of Shakespeare. The omitted six were *Titus Andronicus*, *Troilus and Cressida*, *Richard II.*, and the three parts of *Henry VI.* Shakespeare's text was in all cases freed from eighteenth-century improvements, a purgation which even Macready had left very incomplete. All the plays were acted and mounted with care and completeness, and the taste and ingenuity displayed in the staging of such difficult works as *A Midsummer Night's Dream* and *Pericles* wrung praise even from grudging critics. Not only Shakespeare, but Webster, Beaumont and Fletcher, Massinger,

Phelps at Sadler's Wells.

Otway, Macklin, Goldsmith, Sheridan, and many other classic playwrights found a place in the repertory; while of the moderns, Milman, Sheil, Knowles, Talfourd, Leigh Hunt, Bulwer, Browning, Westland Marston, James White, and Tom Taylor, all had their turn. *Louis XI.* was the only adaptation from the French admitted to the Islington stage, unless we refer *The Fool's Revenge* to Victor Hugo rather than to Tom Taylor. In most of these plays Phelps himself took the leading part. He was at his best in characters which demanded humour or intensity rather than physical grace. In these he was masterly, in all he was competent. He humanised and educated his suburban audiences, and he earned the respect of all intelligent men.

Charles Kean at the Princess's.

It was sometimes asked why Phelps did not remove to a West-end theatre, and there repeat his experiment under happier auspices. His own explanation was that he feared failure, and felt no disposition to 'act off the stage' as well as on. The field was thus left free for Charles Kean, who opened the Princess's with *Twelfth Night*, September 28, 1850. During the first season Keeley was his partner, but from 1851 until he gave up management, August 29, 1859, Kean reigned alone. His Shakespearean productions were —*Twelfth Night*, *Hamlet*, *As You Like It*, *The Merchant of Venice*, *Henry IV.* (pt. i.), *The Merry Wives*, *King John*, *Macbeth*, *Richard III.* (Cibber's text), *Henry VIII.*, *A Winter's Tale*, *A Midsummer Night's Dream*, *Richard II.*, *The Tempest*, *King Lear*, *Much Ado*, and *Henry V.* All of these were carefully, and some very gorgeously, placed upon the stage, the more important productions being elucidated by an archæological 'fly-leaf' issued with the programmes. Kean, says Mr. Godfrey Turner, had this advantage over Macready, that he came to power just when the pre-Raphaelite movement was making itself felt, and when the

'false, mannered, lifeless presentments drawn by Maclise from the masquerade warehouse were being swept from recollection by Millais and Holman Hunt.' He was inferior to Phelps in taste and poetic feeling, but he had much greater means at his command. Compared with Mr. Irving, he seems to have cared more for processional pageantry, and less for rich solidity of presentation. As an actor he was not great in Shakespearean parts. It was in melodrama that he shone, and his chief personal successes were in Boucicault's adaptation of *The Corsican Brothers* (1852), of *Faust and Marguerite* (1854), and of *Louis XI.* (1855). Among the other productions of his management were Westland Marston's *Anne Blake*, Jerrold's *St. Cupid* and *Heart of Gold* (despite the memorable feud between Jerrold and Kean), Reade and Taylor's *First Printer*, and a splendid revival of *Sardanapalus*. His wife was, of course, the mainstay of his enterprise, and his company included at different times the Keeleys, the Wigans, Wright, Bartley and Harley (who both died in 1858), Meadows, Ryder, Fisher, and Carlotta Leclercq. Miss Kate Terry first appeared on the stage under Kean's management in 1851, Hermann Vezin, Dion Boucicault, and Miss Heath in 1852, and Miss Ellen Terry in 1856. His retreat from management was of course signalised by a banquet, got up by his brother Etonians, at which Mr. Gladstone occupied the chair.

The patent theatres.

This period was one of drear decadence at the Patent Theatres. Covent Garden, then in the hands of Anderson, 'the Wizard of the North,' was burnt down after a masked ball on March 5, 1856. Drury Lane, in 1852, found a showman-manager in E. T. Smith, at a rental of 3,500*l.* a year, in place of the 10,200*l.* paid by Elliston thirty years before. From *Hamlet* to horsemanship, nothing came amiss to Smith. The 'unparalleled tragedian,' G. V. Brooke, a robustious actor of Shakespearean parts, who met his end

heroically in the loss of the 'London,' was one of his most attractive stars. Charles Mathews, Barry Sullivan, and Miss Glyn played under his management, and E. L. Blanchard commenced the series of yearly pantomimes which has been continued to the present season. From this time forward the two patent houses were largely dependent upon the seasons of opera—English, German, and Italian—for which their vast proportions fitted them. Covent Garden, indeed, rebuilt and re-opened in 1858 as the Royal Italian Opera House, may now drop out of our record.

Buckstone at the Haymarket.

The Haymarket, though fairly prosperous under Buckstone's management, was not at first fertile in novelties. Here, in 1853, Helen Faucit produced Browning's *Colombe's Birthday*; and here, in 1855, William Farren the elder, most finished of comedians, took his farewell benefit. Tom Taylor's *Overland Route* may stand as a type of the light pieces contributed by him and such writers as Stirling Coyne and Palgrave Simpson to the repertory; while tragedy and melodrama gradually became rarer and more rare on the Haymarket boards. In 1861 E. A. Sothern, an English actor who had made a name in America, enraptured London by his performance of Lord Dundreary in *Our American Cousin*, which ran for 477 nights. It was followed by other pieces, such as T. W. Robertson's *David Garrick* and Westland Marston's *Favourite of Fortune*, specially adapted to the peculiar talent of the actor. At the Adelphi, French melodramas, such as *The Marble Heart* (1854) and *Janet Pride* (1855), and English imitations, such as *The Dead Heart*, by Watts Phillips, were relieved by broad farces and burlesques of the boisterous and word-twisting style which was now beginning to supersede the refined manner of Planché. The chief success of the period was Boucicault's legendary *Colleen Bawn*, which ran for 231 nights, and was followed by *The Octoroon*, from the

Webster at the Adelphi.

same pen. At the Olympic, the genius of one actor, Frederick Robson, dominated almost the whole of this period. He made his first appearance in 1853, attracting attention by the intensity of his Shylock in F. Talfourd's burlesque of *The Merchant of Venice*, and confirming his reputation by his Desmarets in Tom Taylor's *Plot and Passion*. Robson was the Edmund Kean of extravaganza. His merit, and it amounted to genius, lay in 'his rare power of combining tragic passion and real hints of the terrible with ludicrous burlesque.' His most remarkable performances were the Yellow Dwarf in Planché's extravaganza, Medea in R. Brough's burlesque, Daddy Hardacre, and Sampson Burr in Oxenford's *Porter's Knot*. Robson was seconded at the Olympic by Alfred Wigan (a most accomplished actor, especially of French characters), Mrs. Stirling, Miss Herbert, &c., who appeared in Tom Taylor's *Still Waters Run Deep*, *Retribution*, *A Sheep in Wolf's Clothing*, and other more or less noteworthy and more or less original plays. In 1863 Tom Taylor's *Ticket-of-Leave Man* (*Léonard*) commenced its run of 406 nights; and in the following year (August 12, 1864) Robson died. At the Princess's the retirement of Charles Kean was followed, in 1860, by the appearance of the French actor Charles Fechter in *Ruy Blas*. Despite his 'impossible accent,' his 'fair-haired impassioned Hamlet, the very pride and pearl of poetry,' took London by storm; but his Othello was much less successful. He made no further Shakespearean experiments, but, on entering upon management at the Lyceum in 1863, fell back upon French melodrama, *The Duke's Motto*, *Bel Demonio*, &c. Since the close of the Mathews management nothing of much note had occurred at the Lyceum, except the first appearance of Miss Marie Wilton (1856) in a revival of *Belphegor*, by Charles Dillon, and the production of Falconer's Irish drama *Peep o' Day* (1861),

The Olympic: Robson.

The Princess's: Fechter.

The Lyceum.

which almost rivalled the *Colleen Bawn* in popularity. The St. James's, an unlucky house, was for long devoted to youthful prodigies (the Bateman children) and French and German plays, but at last developed into a comedy theatre of good repute, under the management first of Mr. Alfred Wigan, then of Miss Herbert. The Strand Theatre, after an eventful but very undistinguished career of some twenty-five years, found its vocation in 1858, when, under the management of Miss Swanborough, it became the special home of modern burlesque—the burlesque of the Broughs, Talfourd, Byron and Halliday, as opposed to that of Planché. Here it was that Miss Marie Wilton established her fame; and with her we pass to our next period.

The St. James's.

The Strand.

But first a word as to the playwrights of the period we are leaving. Of Jerrold, Marston, Planché, and Oxenford I have already spoken. Tom Taylor possessed dramatic instinct without inspiration. His best plays were careful, workmanlike, effective productions, but mechanical in humour and pathos, and, when he soared into metre, of wonderfully wooden versification. He was far from being, as was often alleged, deficient in originality. He borrowed his methods from France, and some of his motives—ten out of a hundred, he himself tells us—but even in his adaptations he showed plenty of inventive skill. What he lacked was intensity of imagination and spontaneity of humour. His collaboration was of the greatest value to Charles Reade, restraining, oddly enough, the excessive theatricality in which that fervid genius was apt to indulge in writing for the stage. The career of Dion Boucicault has extended over almost the whole of the Queen's reign, but the middle period was that of his greatest activity. He has been called 'the adaptive Mr. Boucicault,' but to him, too, the epithet is something of an injustice. If he has adapted much, he has also invented much. His mastery of stage effects and expe-

Playwrights of the period.

dients is unrivalled on this side of the Channel. A little more intellectual seriousness and artistic concentration might have made of him a great dramatist. As it is he has done a marvellous quantity of adroit and entertaining work. In dialogue, his Irish humour is inexhaustible and delicious; but when he drops the brogue his wit is apt to be artificial. The other playwrights of the period—such as Stirling Coyne, a writer of all-work, Watts Phillips, a melodramatist, and Palgrave Simpson, a personal pupil and imitator of Scribe—do not call for detailed notice. George Henry Lewes busied himself a good deal about the stage, but, after the failure of a play named *The Noble Heart* at the Olympic in 1850, he seems to have dealt solely in adaptations.

Third period, 1865-87.

Miss Marie Wilton and Mr. H. J. Byron rose together into popularity at the Strand Theatre. From 1858, when Charles Dickens was enchanted with Miss Wilton's Pippo in Mr. Byron's burlesque *The Maid and the Magpie*, until 1865, when they entered into partnership to establish a second Strand in Tottenham Street, actress and author had alike been confirming their hold upon the public. In the paths of comic journalism, meanwhile, Byron had encountered and helped to the front two men who were destined to have no small influence on the history of the stage—Mr. T. W. Robertson, an obscure actor and unsuccessful playwright, and Mr. W. S. Gilbert, an almost briefless barrister. Cambridge had contributed Mr. F. C. Burnand to the light brigade of parodists, and Oxford Mr. Robert Reece. Thus a new generation of wits and rhymesters was gathering strength in the early eighteen-sixties, while the provincial stock-companies, now things of the past, were maturing a new generation of actors and actresses. Mr. Bancroft, Mr. Hare, Miss Madge Robertson, and Miss Neilson made

The rising generation of 1865.

their first London appearances[1] in 1865; Mr. Irving, Mr. Kendal, Mr. John Clayton, and Mr. Charles Wyndham in 1866. These two years, then, brought to the capital the managers (present or past) of the Prince of Wales's, the Lyceum, the Haymarket, the Court, the St. James's, the Criterion—all the theatres, except the Princess's, which have taken a leading part in the so-called theatrical revival.

The Prince of Wales's and other comedy theatres.

It was with no design of regenerating the stage that Mr. Byron and Miss Wilton opened the Prince of Wales's Theatre in April 1865. They intended to rely upon burlesque and the lightest of comediettas; but the great success of Mr. T. W. Robertson's comedies soon removed burlesque from the bill and Mr. Byron from the management. From November 1865, until his death in 1871, Mr. Robertson retained almost exclusive possession of the Prince of Wales's stage. *Ours*, *Caste*, *Play*, *School*, and *M.P.* were produced and reproduced with ever increasing success. The theatre was redecorated from time to time and converted into a luxurious little boudoir. Each play was more carefully and sumptuously staged than its predecessor, and a minutely modern style of acting was cultivated. Society flocked to see itself reproduced, or rather 'taken off,' and the stalls[2] gradually encroached upon the pit. After Mr. Robertson's death Mr. and Mrs. Bancroft continued for five years to apply their peculiar methods to English plays, old and new, before they were driven to seek fresh matter in France. They revived with success *Money*, *The School for Scandal*, and *Masks and Faces*. They failed with *The Merchant of Venice*, which nevertheless brought Miss Ellen Terry into fame. They produced Mr. Wilkie

[1] That is to say, their first appearances of any note. Some of them had appeared and quickly disappeared in earlier years.

[2] Said to have been first introduced by Bunn at Drury Lane in 1833, but not generally adopted until very much later.

Collins's *Man and Wife*, and Mr. Gilbert's *Sweethearts*. At last, in 1876, the home supply failed, and they turned to Sardou. *Peril* and *Diplomacy* eclipsed all previous successes, and established a tradition to which the Bancrofts clung, perhaps, too faithfully. In these two plays Mr. and Mrs. Kendal served under the Bancroft banner. In Taylor and Dubourg's *New Men and Old Acres*, and in Mr. Gilbert's fantastic comedies, they had brightened the declining days of Buckstone's management at the Haymarket. Then they had helped Mr. Hare, a seceder from the Prince of Wales's, to convert the Court Theatre into a similiar home of comedy; and thence they passed to the Prince of Wales's itself. The celebrated production of *Diplomacy* brought together on one stage the Bancrofts, the Kendals, and Messrs. Clayton and Cecil. From this point the stream of modern comedy may be said to branch forth into a delta. The Kendals returned to the Court, and soon migrated with Mr. Hare to the St. James's, where their management has been fruitful of noteworthy events. Messrs. Clayton and Cecil succeeded them at the Court, after an interregnum during which Mr. Wilson Barrett made his first appearance as a metropolitan manager. The Bancrofts themselves removed in 1880 to the Haymarket, which, since the retirement of Buckstone, had been for the most part in the hands of the American comedian, Mr. J. S. Clarke. They rebuilt the theatre, entirely suppressing the pit, and carried it on until they retired from management in 1885. Their exclusive trust in revivals and adaptations from Sardou has subjected them to some reproach; but, even if they can reasonably be accused of a certainly timidity, that does not lessen the great positive services they have rendered the stage.

The Court.

The St. James's.

The Haymarket.

While comedy was thus putting forth new strength and cultivating new methods of attraction, tragedy, in a different

Drury Lane.

sphere, was following its example. At Drury Lane, indeed, from 1866 onwards, Mr. F. B. Chatterton, aided from time to time by Phelps, Barry Sullivan, Anderson, Miss Faucit, and Miss Wallis, was illustrating his famous maxim that 'Shakespeare spells ruin and Byron bankruptcy,' and was dragging out a precarious career with the aid of Halliday's spectacular adaptations of Scott, and Boucicault's *Formosa* and *The Shaughraun*. In the cast of *Formosa*, however, there appeared an actor who had risen into note at the St. James's and the Queen's Theatres, and who was destined before long to disprove the manager's maxim, so far as Shakespeare was concerned. From Drury Lane Mr. Henry Irving passed to the Gaiety, and thence to the Vaudeville, where he established his reputation by his performance of Digby Grant in Mr. Albery's comedy of *Two Roses*. This procured him an engagement at the Lyceum, which had passed through several vicissitudes since the end of Fechter's management, having witnessed the production of such very diverse pieces as Westland Marston's *Life for Life* and Hervé's *Chilpéric*. It had now been taken by Mr. H. L. Bateman, an American manager, who opened his campaign, September 11, 1871, with Mr. Irving as a leading member of his company. In the following November Mr. Irving's Mathias in *The Bells* took all London by surprise, and henceforward his career was one of almost uninterrupted success. In Mr. Wills's plays of *Charles I.* and *Eugene Aram* he created the title parts, and then, in *Richelieu*, successfully braved comparison with the great actors of the past or passing generation. His appearance as Hamlet was now expected with intense interest. It took place on October 31, 1874, and finally assured his position. The play ran for 200 nights —far longer than any previous Shakespearean production. This protracted run, however, had a bad effect upon Mr. Irving's style, and his next performances, Macbeth and

Mr. Irving at the Lyceum.

Othello, met with much less favour. The production of Tennyson's *Queen Mary*, though on the whole a failure, brought Mr. Irving a personal success in the part of Philip II. In Richard III. he recovered the ground he had lost in Macbeth and Othello. Two striking melodramatic successes followed—the double part of Dubosc and Lesurques in *The Lyons Mail*, and Louis XI. After her husband's death in 1875 Mrs. Bateman managed the theatre; but on December 30, 1878, Mr. Irving took the management into his own hands, engaging as his chief supporter Miss Ellen Terry, who, since her performance of Portia at the Prince of Wales's, had won fresh laurels at the Court in *New Men and Old Acres* and in Mr. Wills's *Olivia*. Mr. Irving's management opened with *Hamlet*, which was followed by the *Lady of Lyons* and the *Iron Chest*. Stage decoration, somewhat neglected under the Bateman rule, was now studiously elaborated. *The Merchant of Venice* (1879) led the way for other Shakespearean revivals—*Othello* (with Mr. Edwin Booth), *Romeo and Juliet*, *Much Ado*, and *Twelfth Night*—each of which has eclipsed its predecessor in scenic splendour. *The Corsican Brothers* and Mr. Wills's *Olivia* have also been elaborately revived; Tennyson's tragedy of *The Cup* has been produced, the second act set in a stage-picture of the rarest beauty; and, lastly, a version of *Faust* has been placed on the stage with extraordinary profuseness of decoration. Financial success has followed all Mr. Irving's undertakings, with a faithfulness unprecedented in the history of English management, and the vogue of the Lyceum does not show the slightest tendency to decline.

He assumes the management.

The Princess's, before it came under the management of Mr. Wilson Barrett, went through many adventures. It was the scene of some noteworthy productions, but it never remained long in the same hands. Between 1864 and 1880

The Princess's.

it saw the production of Westland Marston's *Donna Diana*; Boucicault's *Streets of London*, *Arrah-na-Pogue*, and *After Dark*; Charles Reade's *It's Never too Late to Mend*, and his adaptation of Zola's *L'Assommoir*, entitled *Drink*; Mr. Wills's first play *The Man o' Airlie*, and his *Mary Queen o' Scots* and *Jane Shore*. It was thus associated mainly with stirring and sensational plays, so that when Mr. Wilson Barrett took the reconstructed theatre in 1881, he adhered to its traditions in devoting it to modern melodrama. He did good service in bringing Mr. G. R. Sims and Mr. H. A. Jones to the front, the former with *The Lights o' London*, the latter with *The Silver King*, written in collaboration with Mr. H. Herman. His departures from the path of melodrama have not been so fortunate. His revival of *Hamlet* was intelligent but not remarkable, while his production of Lord Lytton's *Junius* resulted in disaster. On the other hand, Mr. Sydney Grundy's tragedy of *Clito*, a vigorous piece of work, met with some favour.

The Olympic.

The Olympic, under the ostensible management of Mr. Henry Neville, for some time maintained its position with such plays as Tom Taylor's *Lady Clancarty*, and Oxenford's adaptation of *The Two Orphans*, but has for several years lain under a cloud of unpopularity.

The Adelphi.

The Adelphi has passed through several hands since the retirement of Benjamin Webster in 1874, but has on the whole kept up its reputation for stirring melodrama.

Drury Lane.

Drury Lane, under the management of Mr. Augustus Harris, which commenced in 1879, has taken a new lease of life, and has become the chosen home of mechanically sensational melodrama varied by pantomime of superlative spectacular magnificence.

New theatres.

Scarcely a year has passed during this period without making at least one addition to the roll of West-end theatres. The Queen's Theatre was opened by Alfred Wigan in 1867; but, though it was the scene of some important productions, such as Tom Taylor's *Jeanne d'Arc* and *'Twixt Axe and*

Crown, it did not prosper, and after some ten years or so ceased to exist. The Globe and the Gaiety—the latter a theatre-of-all-work, but chiefly dedicate to the 'sacred lamp of burlesque,'—were opened in 1868, the Charing Cross Theatre (now Mr. Toole's) in 1869. The Vaudeville, where Mr. Albery rose into note, and where *Our Boys* ran for four years and a quarter, dates, with the Opera Comique, from 1870. In 1871 Miss Litton opened the Court Theatre. The Criterion, the Palais Royal of London, was opened in 1874. Since then we have seen the Savoy, the Comedy, the Avenue, the Prince's (now the Prince of Wales's), and the Empire added to the list, and this enumeration is by no means exhaustive, even as regards the West End. It should be noted that several of these theatres have been given up mainly to the form of entertainment loosely described as opera-bouffe, which came into existence about the beginning of our present period. It was in 1865 that Planché adapted Offenbach's *Orphée aux Enfers* for the Haymarket, and the extraordinary success of *The Grand Duchess of Gerolstein* followed two years later at Covent Garden. Since then the vogue of opera-bouffe, though now and then seeming to decline, has on the whole maintained itself. The witty, though sometimes licentious, French librettos have invariably been vulgarised in the process of adaptation, and often brought down to the level of our indigenous burlesques; so that the increase of theatrical activity which we owe to French comic opera is scarcely a subject for rejoicing. Out of evil, however, good has come, for the graceful and witty musical extravaganzas of Mr. W. S. Gilbert and Sir Arthur Sullivan have no doubt sprung, by way of reaction, from opera-bouffe.

Opera-bouffe.

The increased popularity of the theatre has been accompanied, some of us would fain believe, by an improvement in the average quality of dramatic authorship.

Playwrights of the day.

If no writer of the first mark has habitually worked for the stage, we have at least a considerable number of workmanlike playwrights, who take their calling seriously and are not without literary aspirations. Lord Tennyson's dramatic experiments are to be regarded as symptoms or consequences of the dramatic revival, rather than as contributory causes. Had he turned his attention earlier to the stage, and studied its conditions, he might probably have achieved success; but when his genius was at its prime the stage offered him no temptations. Our other poetic playwright, Mr. W. G. Wills, has chanced on some powerful scenes in the course of his industrious career, but is too haphazard a playwright and too poor a poet to hold an enduring place on the stage or in literature. Mr. W. S. Gilbert's original humour and quaint inventiveness are combined with a care for literary finish which gives all his work a value of its own. Mr. A. W. Pinero has a gift of humour not unlike Mr Gilbert's, but less fantastic, while his invention is even more fertile; but he, like Mr. Gilbert, is too apt to import his own peculiar quaintness into serious work. Mr. Albery's early plays gave evidence of a poetic wit which has unfortunately been frittered away in adaptations, not always of the worthiest order. Mr. Sydney Grundy's constructive ingenuity and crispness of expression lead us to expect more from him than he has hitherto done. Mr. H. A. Jones has proved himself a competent playwright and has shown a desire, which may one day become a power, not only to invent and construct but to observe and think. Mr. G. R. Sims is a facile melodramatist and farce-writer; and Mr. Herman Merivale has done one or two things so remarkably well that one cannot but hope he may yet do something still better.

A word must be said of the foreign actors who have figured largely in the theatrical history of the past fifty

years, and especially of the past twenty-five. Long before the Queen's Accession French companies had frequently visited London. The theatre in Tottenham Street, which afterwards became the Prince of Wales's, was for some time their headquarters. Frédéric Lemaître, for instance, first appeared on the English stage at that little playhouse. The St. James's was afterwards the recognised home of French acting; but the great Rachel played at Drury Lane, under E. T. Smith's management. Her rival, Ristori, was a frequent visitor from 1856 onwards; and Italy has sent us two other actors of genius in Ernesto Rossi and Tomaso Salvini, whose Othello took the town by storm in 1875. From America we have had Charlotte Cushman, Joseph Jefferson, Edwin Booth, and Mary Anderson—all remarkable artists in their way. Madame Modjeska, too, though by birth a Pole, came to us from America. German actors, such as Emil Devrient and Kühn, have appeared from time to time, and the 'Gesammtgastspiel' of the Meiningen company at Drury Lane in 1881 was a revelation in scenic art. Of infinitely greater importance, however, was the visit of the whole Comédie Française[1] to the Gaiety in 1879. Apart from the factitious vogue of Madame Sarah Bernhardt, the dignity and completeness with which this great company presented its remarkable repertory certainly opened the eyes of many thinking people to the worthier possibilities of dramatic art, and potently aided the theatrical revival.

Foreign actors on the English stage.

In treating this 'revival' as an accomplished fact, I may seem to beg a quite unsettled question. All I mean is that, during the past twenty years, the theatre has occupied a larger place in the national consciousness, and has drawn

The 'theatrical revival'—how far genuine.

[1] A portion of the company appeared at the Opera Comique during the civil war of 1871, but though their artistic success was great, their visit passed almost unnoticed by the general public.

much larger sums from the public pocket, than during the earlier portion of the Queen's reign. This will scarcely be questioned; more than this I do not allege. The ultimate causes of the revival I cannot pretend to determine. No doubt it is partly due to the gradual decay of the old Puritan prejudice against the theatre—a prejudice which now survives chiefly in the ineradicable habit of holding dramatic art, not necessarily sinful, but essentially frivolous. The railway system, too, with the consequent flocking of provincial sightseers to London, is said to have contributed greatly to the prosperity of the metropolitan stage. But this cuts two ways. Comparative statistics are not easily obtainable, but I believe that the growth of theatrical enterprise in the provinces has kept pace with the growth of population; and the increased facility of locomotion takes London to the country at least as much as it brings the country to London. The old stock-companies have utterly passed away. Every successful novelty is now promptly presented in facsimile to provincial playgoers by means of touring 'combinations,' often organised and sent out by the London managers. Even the East-end and transpontine playhouses, though they still nourish a declining school of melodramatists, are verging towards the condition of provincial theatres, supplied with West-end plays by travelling companies. This centralisation of theatrical life of course tends to enrich a certain number of metropolitan speculators, but it would be a mistake to attribute the general increase of prosperity in the theatrical world of London solely, or even largely, to the influx of country cousins. If it could be proved that the country theatres lose what the London theatres gain, this would explain the revival, or rather explain it away. The fact is quite otherwise, and we are no nearer than before to an effective explanation.

Its causes.

We can scarcely be wrong, I think, in recognising the old Prince of Wales's and the Lyceum as the theatres in which the revival first manifested itself. At the Prince of Wales's the externals of modern life were reproduced with photographic faithfulness, while Robertson's 'cup-and-saucer' comedies, thin and trivial as they were, perhaps came nearer than any earlier plays to a reproduction of the everyday manners and speech of society. At the Lyceum the poetical and romantic drama was interpreted with subtlety rather than vigour, and with a total abandonment of the old declamatory methods. At both theatres a great and ever-increasing luxury of mounting and costume ministered to the cravings of a generation devoted to the lust of the eye and the pride of life. At both theatres the art of 'character-acting'—the new art, it may almost be called—was strenuously cultivated. The old classification of actors as tragedians, light comedians, walking-gentlemen, 'juveniles,' low comedians, and so forth, had broken down. The leading actors of the new generation came under none of these categories. Mr. Irving's finest performances placed him practically in the class of character-actors, along with Mr. Hare, Mr. Bancroft, Mr. Cecil, and younger men such as Mr. Mackintosh, Mr. Beerbohm Tree, Mr. Brookfield, and Mr. Willard. Character-acting, then, which may be defined as mimetic realism, the minute and unconventional reproduction of observed idiosyncrasies, is to be regarded as the distinguishing feature of this period. Combined with luxury of scenic illustration, it met a demand and begot an increase of appetite. This statement, however, brings us no nearer the solution of the problem, unless we can analyse the intellectual and social conditions which produced so marked a demand at the particular period from which the revival dates. I cannot here attempt such an analysis; indeed the time for it has perhaps scarcely come. Madame

Its starting-points.

Its leading features—scenic realism and character-acting.

Vestris had long ago given great attention to stage furnishing, the Wigans had cultivated a quiet and unexaggerated style of acting—why was it reserved for the Bancrofts to secure lasting success by these methods, and to start so many others on the same path? Macready and Charles Kean, again, were careful of archæology, and dealt in 'scholarly' revivals—why has it been reserved for Mr. Irving to find in archæology and scholarship the strings to a Fortunatus purse? These are questions which the sociologist of the future may one day answer, perhaps when our boasted 'revival' is a thing of the past. The decline of the present mummery-mania—so scoffers have called it—may enable us to discern more clearly the causes from which it has arisen. At the same time one cannot but hope that the financial revival, such as it is, may prove permanent, and may give scope for another revival, as yet scarcely making itself felt, which shall replace the living drama among the most honourable and honoured forms of English literature.

WILLIAM ARCHER.

MUSIC.

Music has had a full share in the life and movement so characteristic of the last half-century, and this not in one branch but in all.

Before tracing briefly the progress of each department, it may be well to sketch the prominent features of music in England at the date of the Queen's accession.

Music in 1837.

In 1837 Mendelssohn paid his fifth visit to this country, and produced his oratorio 'St. Paul.' Sterndale Bennett was rapidly establishing his claim to the foremost position among English composers since Purcell. In London the Philharmonic Society gave excellent performances of orchestral works, and introduced to the English public many new symphonies and overtures. The Sacred Harmonic Society devoted itself with success to the efficient production of oratorios and choral music. The concerts of Antient Music called attention to the wealth of beauty to be found in the neglected writings of the Elizabethan composers and others. In the country, the three choirs of Worcester, Gloucester, and Hereford gave their annual festival. Norwich also had a triennial gathering. The Birmingham Festival had already taken rank as the most important musical event of its year. Manchester had its Gentlemen's Concerts, and in 1837 was founded the Bristol Madrigal Society, which recently gave its Jubilee concert, and which with the Madrigal Society of London has had a large share in keeping up the knowledge of and taste for old English music.

Notwithstanding these signs of vigorous musical life, it cannot be said that music was flourishing in this country. The art was cultivated without system and criticised without intelligence by the average Englishman. The Royal Academy of Music was in the early and struggling stages of its long and honourable career. No other institution for the scientific training of students existed. Ladies' schools sent out their pupils, after 'finishing' lessons, to play feeble airs with variations, or at best to mangle the three or four sonatas of Beethoven which had become popular. Few men would venture to engage in such an effeminate pursuit. Public schools ignored it altogether. At the Universities, degrees in music were given without examination, and on the strength of an exercise by no means always written by the candidate. The best music was difficult to procure, and so expensive as to make its possession in any quantity impossible for the general public. Except in London, a complete oratorio or a symphony was rarely heard. The cathedrals were asleep, and, with insufficient choirs, performed languid music to scanty congregations.

The *Musical World* of January 6, 1837, gives the following account of a service in St. Paul's Cathedral:

'A few days since, an anthem by Dr. Hayes was undergoing the semblance of a performance. The choir present, representing the six Vicars-choral, were Mr. Dando, Mr. Willing, both counter-tenors, and Mr. Pinsent. The bass, not being, we suppose, an essential part of a chorus anthem, was omitted. Of course the organ with its thunder-stop carried all before it. Whether the worthy trio sang or not we cannot accurately determine. If they did they very wisely let the sounds come from their lips—

> So softly, that like flakes of feathered snow
> They melted as they fell.

To one of Dr. Wesley's most famous anthems is appended a note, that it was composed for an Easter Day service in Hereford Cathedral, when only the boys and a single bass voice were available.

Forty years ago, Charles Kingsley in 'Yeast' describes a service in St. Paul's Cathedral. 'The afternoon service was proceeding. The organ droned sadly in its iron cage to a few musical amateurs. Some nursery-maids and foreign sailors stared about within the spiked felon's dock which shut off the body of the cathedral, and tried in vain to hear what was going on inside the choir. As a wise author—a Protestant too—has lately said, "the scanty service rattled in the vast building like a dried kernel too small for its shell." The place breathed imbecility and unreality and sleepy life in death, while the whole nineteenth century went roaring on its way outside.'

Parish churches in towns still left the psalms to be said alternately by clerk and people. Country churches were often without music of any kind. Hymn-books had not come into general use, and the 'new version' of the psalms, already 150 years old, was sung with the aid of a barrel-organ or with the grotesque assistance of a 'cello, flute, and bassoon. Organs were few. A graphic description of the Church service at this period, too well known for quotation here, may be found in the first pages of George Eliot's 'Amos Barton.'

Musical literature was small in quantity and poor in quality. The ordinary newspaper hardly noticed music at all. The *Harmonicon*, a well-conducted monthly periodical, died in 1833, and the *Musical World* had not yet established its position. The history of the art was buried in the ponderous volumes of Burney and Hawkins. At this time music was not recognised by the State, and the small grant of 500*l.* to the Royal Academy did not begin until

1864. Grants to elementary schools for music were not given until 1872.

Absence of training schools.

In this brief review of musical affairs the most serious feature is undoubtedly the lack of good training-schools. The Royal Academy was utterly unable to cope with the vast amount of musical ignorance. Only in the last two decades has any serious attempt been made to supply this want. And yet the English race, though not at this time musically creative, had a natural power of appreciation and of intelligent performance not surpassed by that of any other people. In 1840 the Committee of Council on Education inquired into the condition of vocal music as taught in children's schools, and in 1841 published a prefatory minute on this subject. John Hullah and Sir James Shuttleworth (Secretary of Education) went to Paris to inquire into Wilhem's method of teaching singing. The Committee of Council prescribed times to be given in schools to the practice of vocal music; they also encouraged the commencement of singing classes for teachers under Mr. Hullah. In 1843 the training colleges came under inspection, and music was included in the curriculum of studies. From 1843 to 1860, 25,000 persons passed through Mr. Hullah's classes.

In 1850 the Tonic Sol-Fa system of teaching singing, based upon key relationships, began to attract public notice under the energetic advocacy of the Rev. John Curwen, and its wide popularity is now beyond dispute. Eighty per cent. of school children taught by note learn on this system, and its extensive use is shown by the fact that 39,000 copies of 'The Messiah' in that notation have been sold.

The success which attended these efforts encouraged the Government to offer grants for singing, which were first introduced with the Code for 1874. In the first year the schools received about 90,000*l.* under this head. In 1885–86

the Parliamentary grant for singing was about 130,000*l.*, exclusive of the expenses of inspection.

Establishment of training schools.

Of the higher musical education, the Royal Academy has until recently been the only instrument, and under the enlightened direction of Crotch, Cipriani Potter (1832–59), Charles Lucas, Sterndale Bennett, and Macfarren, it has done invaluable work in spite of crippled resources and insufficient encouragement. Many of our chief musicians owe their early training to it. First and foremost are Sterndale Bennett, the Macfarrens, Arthur Sullivan, and Joseph Barnby, among many others. The Academy has also educated a large number of the principal singers, instrumentalists, and teachers. In 1873 the National Training School was founded, under the direction of Mr. (now Sir Arthur) Sullivan. After some years of good work an attempt was made to establish a really national school by the fusion of this institution with the Royal Academy, but the result was a failure. H.R.H. the Prince of Wales, with characteristic earnestness, then initiated a scheme for the Royal College of Music. An influential meeting was held in St. James's Palace on February 28, 1882, over which the Prince of Wales presided. The meeting was also addressed by the Duke of Edinburgh, Archbishop Tait, Mr. Gladstone, and others. Funds were soon collected which would warrant the foundation of fifty scholarships, in addition to several others founded by private munificence. Sir George Grove, to whom the literature of music owes so much, was appointed director, and in 1883 the College was formally opened with an efficient staff of teachers, which now includes Messrs. Pauer, Franklin Taylor, Barnett, Holmes, Henschel, Visetti, Blume, Stanford, Parry, Bridge, and others. The College is subjected to a searching examination every year by experts unconnected with it. Already many of its students are honourably filling important posts, but it is of

course as yet too early to gauge the work. The rapid rise of the Guildhall School of Music is also a remarkable fact, and clearly shows the need of such institutions. This school began in 1880 with 62 pupils; in 1886 it numbered 2,500 pupils with 90 professors. Admirable buildings have been provided for its use on the Thames Embankment. Trinity College and other private schools too numerous to mention have also done good service. In addition to these organisations for teaching, examinations are held in all parts by the Royal Academy and by Trinity College. The College of Organists holds twice a year an examination for its diplomas of associateship and fellowship. The large number of candidates and the comparatively few successes are evidences, on the one hand, of the value attached to the distinction, and of the severity of the test on the other. All the chief organists of the kingdom in turn serve as examiners.

The Public Schools could hardly escape the general spread of musical cultivation, though it is not until within the last twenty years that much has been done. Fifty years ago the art was discouraged by the masters and despised by the pupils. The music-teacher, when he existed at all, shared with the French master the gibes of the boys. Now, though there is no excessive enthusiasm to report, the head master is not usually in active hostility. Chapel services in many places are bright and hearty. School orchestras and school choral societies give really good concerts. 'House' singing competitions are held, and in many ways music is encouraged. Uppingham School may be said to have so far produced the best result, but nearly all the large schools are working well. As might be expected, this state of things has sensibly raised the standard at the Universities. The Cambridge University Musical Society, under Dr. Stanford, has shown remarkable energy in producing works of importance not hitherto known in

this country. The Oxford University Musical Club has devoted itself to chamber music, and has had a powerful influence in cultivating a taste for the best works in this class. Almost every college in both Universities has its own society, its own concert, and its own chapel choir. On Sundays at the least some attempt is made to break the dullness of a read service. Music aldegrees are now given after severe and searching examination only, and some evidence as to general education is now required.

Musical literature.

The increased musical activity of the last twenty-five years has created a thirst for information on all subjects connected with the art, from acoustics to the smallest biographical details concerning the great composers, a thirst which has been satisfied by works of the highest value. It must be confessed that the most useful additions to musical literature have been translations from the German. After the preliminary gropings of many able men, the theory of sound has at last been established upon an unassailable basis by the labours of Helmholtz. His great work, 'The Sensations of Tone,' has been admirably translated into English by Mr. Alexander Ellis, and his views have been popularised by Professor Tyndall, Mr. Sedley Taylor, and by Dr. Pole in his 'Philosophy of Music.' Theories of harmony are less indebted to foreign sources. The system of Alfred Day, published in 1845, enthusiastically adopted and expounded in several books by Sir George Macfarren, and the works by Goss, Ouseley, and Stainer, are probably at least as original and as near the truth as any to be found among French or German writers.

The first successful attempt to interest the general public in the history of music was made by John Hullah, who delivered a course of lectures at the Royal Institution in 1861, which were afterwards published. These lectures, though similar in arrangement to the history of Kiesewetter

(translated by Robert Müller and published in 1847), are in their main features strikingly original, and give to a general view of musical history a surprising life and interest. Since then we have 'The History of Music' by Emil Naumann, translated by F. Praeger, and Mr. Rockstro's history which made its appearance last year. Musical biography has been greatly enriched by the translation of Spitta's life of Bach (Clara Bell, and Fuller Maitland), of Jahn's life of Mozart, of the lives of Schubert, Berlioz, and others. In addition to these, the letters of Mozart, Beethoven, and Mendelssohn have appeared in an English dress. Carl Engel's works on the 'Music of the Most Ancient Nations' and on National Music deserve honourable mention.

The 'Dictionary of Musical Terms,' edited by Stainer and Barrett, and published in 1876, supplied a great want, and is still useful, though superseded now to some extent by the much more complete 'Dictionary of Music and Musicians,' edited by Sir George Grove, to which all the most eminent authorities have contributed. This work, in addition to a mass of information upon almost every conceivable musical subject, contains an admirable series of lives of the principal musicians, each in bulk almost equal to a separate volume, and in research and grasp of the subject far ahead of anything before attempted in this country.

The newspapers have not failed to adapt themselves to the evident requirements of the age, and now every paper of importance in London or the provinces has on its staff a competent musical critic. New works and new performers are judged with unfailing keenness and in most cases with great freedom from bias. Music has had its own organs during all the period we have under review—the principal being the before-mentioned *Musical World*; the *Dramatic and Musical Review*, commenced in 1843; the

Musical Examiner, edited by J. W. Davison; the *Monthly Musical Times* (Novello), which has proved the most stable of all and is in vigorous life at this time; the *Musical Standard*, and now again the *Musical World*.

An account of musical literature would not be complete without some mention of the analytical programmes so common now, which make concerts so much more instructive and interesting to the unlearned listener. According to Sir George Grove, the first attempt in this direction was made in 1841 by Mr. Thomson, Professor of Music in the University of Edinburgh, for the concerts of the Professional Society in that place. These have gradually grown into the shape we know so well in connection with the Monday Popular Concerts, the Crystal Palace Concerts, and the Richter series. The chief writers have been J. W. Davison, Sir George Macfarren, Herr Pauer, and Sir George Grove.

Publication of music.

The publication of music itself has well kept pace with the increased demand.

In 1840 the Musical Antiquarian Society commenced the issue of works by the composers of the Madrigalian era—Byrd, Wilbye, Weelkes, Gibbons, Purcell, and others. In many cases scores of these compositions were only obtained by copying out the single parts.

The Motett Society, founded in 1847 by William Dyce, followed on the same lines, but did not confine itself to the works of English writers—Palestrina, Lasso, Croce, Vittoria, and others appearing side by side with Tallis, Redford, and Farrant. In this case all the compositions were sacred. The Purcell Society, founded in 1876, issued two numbers only, the 'Yorkshire Feast Song' and 'Timon of Athens,' and then collapsed. There is now some prospect of its revival. These publications were too expensive to become popular, but they have been largely drawn upon in

later and cheaper collections. Of these it may perhaps be sufficient to name Hullah's 'Part Music' and Henry Leslie's 'Choral Music,' both admirably edited and both cheap. The *Bach Choir Magazine*, edited by Otto Goldschmidt, has rescued many valuable works from oblivion. The great music-publishing house of Novello has taken the lead in providing cheap music. J. Alfred Novello, the son of Vincent Novello (himself the editor of Purcell's Sacred Music), was the first person to discover that music could be supplied in large quantities at a low price, and that the necessary demand might be created by bringing out cheap editions of standard works. Type-printing of music, which first came into use in 1846, helped largely to diminish the expense. In that year 'The Messiah' and 'The Creation' were issued in sixpenny numbers. Now a large number of oratorios may be bought complete for one shilling. To the same enterprising house is due the attempt to abolish the custom of pricing sheet-music at twice its real value at least. The music-sellers could then (and in some instances now) obtain seven copies of a pianoforte piece or a song at the price of one. This was simply an underhand way of increasing the insufficient fees paid for music lessons. Messrs. Novello marked a reduced price on their music, which did not allow of more than a reasonable profit to the distributor.

In 1846, too, octavo editions were introduced by the same firm, who publish nearly all their oratorios, anthems, and service books in that shape. Other houses have helped in this good cause. Boosey's '*Musical Cabinet* Series' and Chappell's *Musical Magazine* may be mentioned in this connection. With the powerful aid of Peters of Leipzig and Litolff, the best music has now been brought within the reach of all. Even full scores which, from the limited demand, were the most expensive of all, have been made

accessible. One instance of this extraordinary change in price may be quoted as an example. The organ works of Mendelssohn were published in this country at a guinea and a half; they may now be had, beautifully printed, and with the addition of the three preludes and fugues for the same instrument, for fifteen pence.

Improvement in instruments.

The manufacture of musical instruments has made great progress during the last half-century. The most popular of all, the pianoforte, has been increased in compass, enriched in tone, and strengthened in construction to resist the demands made upon it by the enlarged concert-rooms and the severe handling of modern public performers. It is now estimated that 40,000 pianos are made annually in this country, nearly all in London, and, though many of these are exported, this loss is more than made up by the import of German and American instruments. After the piano no instrument is so extensively used as the harmonium. It is of French invention, and may be said to be new during this reign. In spite of its fatiguing and even harsh tone, the harmonium, with which we may include the American and the Mustel organs, has a value of its own. It is inexpensive, portable, keeps well in tune, and supplies the place of an organ in many churches and schools which could not afford money or space for a larger instrument.

The organ itself has had its power doubled, its variety of tone largely extended, by the invention of many new and beautiful stops, its mechanisms improved, so that the additional work thrown upon the player by increased size has been more than neutralised, and its compass changed to the German arrangement. Upon the old G organ it was not possible to play the fugues of Bach. Engines for blowing, made necessary by the increased demand for wind, have been invented, moved by water and gas. By means of the

pneumatic tubular transmission of Willis, and the electrical invention of Bryceson, the instrument can now be controlled at any distance from the player. This aggrandisement of the organ, so to speak, has not been an unmixed good. Increased power has been obtained in many cases at the expense of sweetness of tone, and the tendency has been to make the instrument a mere caricature of the orchestra.. Organs have multiplied past counting during the last fifty years. Now almost every church and Dissenting chapel possesses one. Concert halls, such as the Albert Hall, St. George's Hall, Leeds Town Hall, have enormous instruments, and even the conservative churches of Scotland have given way, and have introduced the 'kist o' whistles' into their service. Other instruments have been brought under better control by various ingenious inventions: those belonging to the wood wind by Boehm's system; brass instruments by valves and other contrivances, which, though facilitating execution, have not always had a good effect upon the quality of tone.

The orchestra itself has been increased in size in order to meet the requirements of the enlarged concert-rooms, and, it may here be said, that for perfect music things have been running too large for some time past; the line may perhaps be drawn at the point where the number of stringed instruments makes a doubled wind band a necessity.

Church music.

Turning now to Church music, the writer has been favoured by the personal recollections of the Bishop of Chichester and Mr. Gladstone as to the state of religious music early in this century. The bishop says: 'My memory goes back to the first decade of this century. The singing was limited to the performance of the new version of the psalms, two portions of which were commonly sung at each service. The musicians were some four or five of

the notables of the parish, the village clerk acting as precentor, and the singers, of about the same number and the same class, all were ranged in the front of the western gallery. The instruments chiefly in request were bassoons, hautboys, flutes, clarionets, and sometimes a violoncello or double bass. Psalms and canticles were read alternately by minister and people, the people bearing their part far better than is now usual. In towns, owing to the existence of schools, the singing was often done by young girls in their charity school dresses to the accompaniment of a barrel-organ. As schools were established in villages, the old choirs, with their varied accompaniments, made way for the shrill voices of the female children. The change was not popular, for the singers, with all their faults, were liked, and the musicians were no less admired.'

The bishop, after remarking upon the greater musical talent shown in Lancashire and West Yorkshire, gives a not quite unfavourable account of the music in St. George's Chapel, Windsor, and Winchester Cathedral, though the superannuated lay clerks impressed him, and at Winchester the feebleness and irreverence of the minor canons. He also complains of the removal of the old sweet-toned organs for the modern harsh-sounding instruments.

Mr. Gladstone remembers Sunday services without a note of music. There can be no doubt that in 1837 the Church service was in a deplorable state. A writer in the *Christian Remembrancer* of 1841 says: 'Nothing is left us but the wretched substitute of the solitary voice of a priest on the one part, and the voice of a clerk on the other, aided by the whisperings of the few worshippers who have courage enough to break silence.'

The barrel-organ, though it might grind out a hymn tune, could not accompany chanting. Even the heterogeneous band in the western gallery, though it might help in an

anthem, was unable to adapt itself to the mixed recitation and measure required by a musical setting of the psalms. The quickened spiritual life of the Church made a fuller musical expression of its services a necessity. Without the organ this was impossible. Now, scarcely a village church but has its organ or harmonium. We have quoted a graphic account of the service in St. Paul's Cathedral in 1837. Much later than this, the writer remembers when ten years old playing at a service in the same cathedral, which was not much more efficient. The magnitude of the change may be seen by any person who cares to attend the Sunday service in St. Paul's now. The vast and reverent crowd which gathers under the dome to listen to the magnificent musical service and the eloquent sermon is proof sufficient of the altered state of things. Even the weekday services are now attended by more people than could have been accommodated in the old choir before the removal of the screen. So far as the cathedrals are concerned, the first sign of life was the commencement of nave services. These were begun on the first Sunday in 1858, at Westminster Abbey, at the earnest instigation of Archbishop Tait, then Bishop of London. Now most of the cathedrals have followed this good example, and in addition to regular Sunday services, at special seasons, such as Advent and Lent, Bach's Passion Music and Spohr's 'Last Judgment' have been given, with greatly enlarged voluntary choirs, and in many cases with orchestral accompaniment. Many parish churches have been stirred into like activity.

In 1856 an event of great importance to Church music took place. The first meeting of Associated Church Choirs was held in Lichfield Cathedral. It would be difficult to exaggerate the influence of this new movement on the musical services of town and country churches. The 'Official Year-Book of the Church of England for 1887' records the

names of 79 such associations. In one festival, that of the Salisbury Diocesan Choral Association, no fewer than 220 choirs took part, with 2,200 voices. It will be readily understood that after joining in such a festival the choirs would not willingly return to a dull service in their own churches. The manner in which music gradually overspread the Church service is a little curious and characteristic of the English people. First, the hymns only were sung. Then the Te Deum and canticles were added, then the versicles and responses, afterwards the psalms; but even now, in deference to the prejudice of old-fashioned people, the psalms are read at morning service in many churches, and chanted only in the evening. The highest act of worship, the celebration of the Holy Communion, was the last to receive musical expression, and there are yet many Church people to whom such treatment is distasteful.

Undoubtedly the hymns are the most popular part of the musical service, and during the last fifty years an enormous number of hymn-books has been published. Of these, 'Hymns Ancient and Modern' is the most widely used, and some years ago 20,000,000 copies had been sold.

It is undoubtedly the High Church party which has exercised the strongest influence upon Church music. To them we owe the determined revival of the plain song. To them also must be attributed the exclusion of the female voice from choirs. There are not wanting signs that here too the whirligig of time brings in its revenges. Girls and women are again helping to lead the services, and the old fiddlers and clarionet-players would have been soothed to know that the orchestra would again make its appearance in the Church with even greater numbers. The first orchestral service of importance is said to have been the performance of Bach's Passion Music in Westminster Abbey, under the conductorship of Mr. Joseph Barnby.

Such events are increasingly frequent both in cathedrals and in parish churches. The service in Dissenting places of worship does not give the same scope to musical treatment, and, though performances of oratorios are not uncommon in chapels, the regular Sunday services cannot be said to have shown much improvement. Almost every town chapel now contains an organ, and many can boast instruments of enormous size, but their use is somewhat limited.

Musical festivals.

We have already spoken of the great festivals which were held at the beginning of the reign. Of these the Birmingham, Norwich, and Three Choirs Festivals are still in full life. Nor must Leeds be forgotten, which inaugurated its new Town Hall in 1858 with a four-days' festival under the direction of Sir Sterndale Bennett; after an interval of thirteen years the second was given, and it has now established itself as a triennial event. The last two, under Sir Arthur Sullivan, have placed this musical gathering on a level even with the Birmingham Festival. Glasgow and Bristol also hold successful meetings. Perhaps no musical performance has excited such widespread interest as the Handel Festival, designed to commemorate the centenary of the composer's death in 1759. After a preliminary and most successful trial in 1857, the great gathering took place in 1859 in the central transept of the Crystal Palace, the only building capable of accommodating orchestra, chorus, and audience of such colossal proportions. The band numbered 460, the chorus 2,700, and the aggregate audience amounted to 81,319. 'The Messiah' and 'Israel in Egypt,' with the Dettingen Te Deum and a miscellaneous selection, were the works given. So successful an enterprise could not fail to be repeated, and every third year has seen a similar gathering, generally with augmented forces. Sir Michael Costa conducted all the festivals until

the last, which was under the bâton of Herr August Manns, the well-known conductor of the Crystal Palace Concerts.

If we turn to ordinary concerts, a glance at the average programme fifty years ago and now will show the much more serious purpose with which music is presented to the public at this time. We have already spoken of the Philharmonic Society, and no praise could be too high for its courageous efforts to bring out the best works, new and old. It is pleasant to record that, under the guidance of Sir Arthur Sullivan and an able committee, the society is still full of life. The 'Concerts of Antient Music' were continued for some ten years of the reign, and doubtless excited the desire, now so prevalent, to know more of old music. The programmes, though mainly consisting of excerpts from larger works, as was perhaps inevitable, are of the greatest interest and show the widest research among hidden musical treasures. It was the custom in this society to place each concert under the patronage of some distinguished man, who chose the programme for the evening; and it is interesting to find that Prince Albert undertook this duty on no less than ten occasions. The music chosen by him may be found appended to Sir Theodore Martin's Life, and the selection gives ample proof of the Prince's extensive acquaintance with the music of all schools. Prince Albert also chose the music for many Philharmonic concerts. The Sacred Harmonic Society, after half a century of good work, has recently been dissolved and its fine library handed over to the Royal College of Music. Mendelssohn and Spohr conducted some concerts of this society, and all the important choral works were worthily given by it. Concerts.

In 1849 was founded the Bach Society, which must not be confounded with or eclipsed by the Bach Choir conducted by Otto Goldschmidt. Early in this century, Samuel Wesley and Charles Horn, to their lasting credit, were acute

enough to discover for this country the transcendant genius of John Sebastian Bach, but their influence upon general opinion was not great, and it is no doubt owing to the enthusiasm of Mendelssohn, heartily shared by Sir Sterndale Bennett, that we owe the first general recognition of his true position among composers. To the Bach Society belongs the great honour of first performing in public in this country the St. Matthew Passion Music. This took place on April 6, 1854, and was conducted by Sir Sterndale (then Dr.) Bennett. Later the first eleven movements of the B minor Mass and the Christmas oratorio were given under the same direction. The society was dissolved in 1870, but in 1875 another association, of amateurs mainly, was formed under the name of the Bach Choir, directed by Mr. Otto Goldschmidt. The new society, though not confining itself to the compositions of Bach, still made the production of his music its chief motive, and at the first concert in 1876 gave the first complete performance of the great B minor Mass. This gigantic work has since been repeated several times, once on a large scale in the Albert Hall, and has made a profound impression. The Bach Choir has also given the 'Missa Papæ Marcelli' of Palestrina, the German 'Requiem' of Brahms, and many other works of importance then little known. It may here be said that after ten years Mr. Goldschmidt resigned his conductorship, to the great regret of the society, which is, however, still prospering under the able direction of Dr. C. V. Stanford. The most remarkable series of concerts given during the half-century is undoubtedly the 'Monday Popular Concerts' of chamber music. The series began on February 14, 1859, under the direction of Mr. S. Arthur Chappell, and on April 4 of this present year the 1,000th performance was given. Two performers, Messrs. Ries and Piatti, who played at the first concert, appeared also at the

last, and during the whole period the enterprise has been under the direction of Mr. Chappell. Such a record is quite unmatched in musical history, and it would be difficult to exaggerate the effect of these concerts upon the cultivation of music in England. The musical taste of the country has been partly led by and partly reflected in the programmes, and it is interesting and instructive to notice the rise and decline in public favour of prominent composers; but of this we shall have more to say. Though it cannot be said that before 1859 chamber music was unknown in England, it was little appreciated by the public. Doubtless Mr. John Ella with his Musical Union, commenced in 1845, and 'Musical Winter Evenings,' established in 1850, prepared the way; but the influence of his concerts was confined within much narrower limits. Almost every player of note has appeared at the Monday Popular Concerts. It would be impossible to give a complete list. Among the chief may be named—for the piano, Madame Schumann, Marie Krebs, Charles Hallé, Hans von Bülow; violin, Joachim, Wilhelmj, Madame Norman Neruda. Piatti has almost monopolised the 'cello. The Crystal Palace Saturday Concerts have done for orchestral music work quite as important as that done for chamber music by the Monday Popular Concerts. This admirable series was commenced in 1855, and more firmly established in 1860. Its educational value has been very great. From the first the music has been under the direction of the present gifted conductor, Mr. Manns, who has, with the invaluable sympathy and co-operation of Sir George Grove, introduced to the English people a large number of unknown and new works of the highest interest, in addition to the constant and careful performance of classical compositions. Lovers of Schubert and Schumann especially owe a debt of profound gratitude to the promoters of these concerts, for it was here that

many of their finest works were first presented in this country. The Crystal Palace would have deserved well of the English people if it had done nothing else than foster and maintain its efficient orchestra. Choral music has also been given, but it is mainly by its instrumental performances that the Crystal Palace has acquired its well-earned fame.

In 1855 Henry Leslie formed the choir which bore his name, and which was for many years the finest exponent of unaccompanied part music. In 1878 this choir gained the first prize at the international competition of choirs in Paris. In 1879 Hans Richter paid his first visit to London and conducted some orchestral works. Since then his concerts have been among the most important events of the musical season, nearly always including a Beethoven symphony and some extract from a Wagner opera; they have also introduced the symphonies of Brahms, rhapsodies of Liszt, &c. Nearly all this elaborate music is conducted by Herr Richter from memory with wonderful verve, and with catching enthusiasm.

Choral societies.

About a quarter of a century ago Mr. Barnby, who had earned his reputation as organist and director of music at St. Andrew's, Wells Street, and St. Anne's, Soho, formed his famous choir. Among its most notable achievements may be mentioned the revival of 'Jephtha' and 'Theodora,' the first adequate performance of the great St. Matthew Passion of J. S. Bach, given also in Westminster Abbey under the same direction. Mr. Barnby also conducted the London Musical Society, which was the first to produce Dvorâk's 'Stabat Mater' and many neglected choral works of Schumann. Mr. Barnby's chief work has been as conductor of the Albert Hall Choral Society, to which he was appointed after it had been under the bâton of Gounod for one year. His chorus here of 850 voices is now probably

unequalled anywhere. With this and a band of 160 performers, Mr. Barnby has brought out almost every work of importance from 'The Messiah' down to 'Parsifal.' So great is the popularity of the society that in its last season of ten concerts the aggregate attendance amounted to 87,000.

In addition to the resuscitated Sacred Harmonic Society under Mr. Cummings, London possesses a large number of choral and orchestral associations of which it would be impossible to give even the names. The musical activity of the country is fairly shown by the list of such bodies in London and the provinces, a list which, though not complete, occupies 28 pages of the 'Musical Directory.' For music in the provinces, no person has done as much as Mr. Charles Hallé. His fine orchestra has not only kept Manchester well abreast of musical progress, but has visited every town of importance in the North of England. To Mr. Hallé belongs the credit of the first performance of Berlioz's 'Faust' and of Schumann's Requiem. A feature of great importance in modern music is the introduction of recitals, chiefly of pianoforte music. The term is said by Grove to have been first used in connection with a performance of Liszt's in the Hanover Square Rooms in 1840. It was adopted by Mr. Hallé, who gave to such performances additional importance by presenting the Beethoven Sonatas in chronological order. Pianoforte music from the earliest times has been given on the same chronological plan. Now the custom has been followed by every great pianist down to Rubinstein and Pachmann.

The great improvement in military bands must not pass without remark, nor the increase in the number of brass bands in the North of England. Doubtless the visits of foreign bands to this country and the competitions at various Exhibitions have done much to arouse emulation and to stimulate activity.

Operatic music.

Within the limits at our disposal it would be impossible to give even in the baldest outline the fortunes of the Opera during the last fifty years. The main feature is the decay and almost death of Italian opera. Weber, Meyerbeer in his later works, Gounod, and Wagner have at least made the Bellini and Donizetti school, with its trivialities and want of earnestness, quite unbearable. At the beginning of the period we have under review, English operatic composers were by no means neglected. Balfe, Wallace, and Loder won considerable fame, and their works were successfully given not only in this country but abroad. Even now some of the best are occasionally given; but they live mainly through a few attractive songs. Now again English composers are coming to the front—Mackenzie, Goring Thomas, and Stanford among others.

So far as this department of music is concerned, the most conspicuous triumph has been won on the lower level of comic operetta. For some years now, London has never been without some work from Mr. Gilbert and Sir Arthur Sullivan. 'Pinafore,' 'Patience,' 'The Pirates of Penzance,' 'Iolanthe,' the 'Mikado,' and now 'Ruddigore,' have provided the nation with unfailing amusement. The libretti generally contrive to bring out some prevailing folly, are written with great skill and fitted to exquisite music, with melodies so natural and flowing that it is difficult to believe they are original. With dainty orchestration, perfect mounting, and good acting, these operettas have thoroughly deserved their popularity, and the only regret is that such good workmanship should be bestowed upon trivial themes of ephemeral interest.

Social music.

Social music has made great advances during the fifty years. If, as we have said, it was considered effeminate for a man to play at all, half a century since it would have been thought at least unfeminine for a woman to play the

violin, much more the 'cello or double bass. Now ladies play them all, and even the clarionet and oboe, without exciting much remark. Lady Folkestone conducts an orchestra consisting exclusively of ladies. The piano no longer monopolises drawing-room music. Not only is there greater variety in the instruments, but the music is of a much higher class. A well-played string quartette may now often be heard in society. In pianoforte music the operatic air embroidered with semiquavers has given place to Bach, Beethoven Chopin, Schumann, Sterndale Bennett, with infinite advantage to the art. The transcriptions of Thalberg and Liszt, though full of most delicate effects and presenting great temptations to the virtuoso, have now almost vanished from the concert-room and the *salon*. Of the feeble works of later writers in the same style it is difficult to speak with patience. The choice of songs, too, shows evidence of the great improvement in the appreciation of real merit. This is not to be wondered at when we remember that fifty years ago *the* great song-writer, Schubert, was unknown. In addition to his six hundred songs we have now those of Schumann, Mendelssohn, Franz, Jensen, Brahms, Rubinstein, not to speak of our own Sterndale Bennett, Hatton, Smart, and living English writers too numerous to mention. Even here, however, change has not been all to the good—the inanities of the songs of fifty years ago were better than the fervid folly of some that may be heard now.

Composition.

In composition, English music has made a great advance, and almost entirely during the present reign. From the time of Purcell to the accession of Queen Victoria, English composers, though producing much excellent work, confined themselves within a narrow range. Church music absorbed a very large part. Glees, the one exclusively English possession, had long been brought to perfection, and

it may here be said that the present neglect of this branch of vocal music is much to be regretted. It is true that English writers have almost continuously produced so-called operas and cantatas, but it is by their smaller works they will live. Precisely at the commencement of the period we have under review, English composers began to challenge criticism in wider fields, and to Sterndale Bennett belongs the honour of the change. His orchestral overtures, symphonies, concertos, cantatas (sacred and secular), church music, chamber music, not only won general acceptance at the time both in England and in Germany, but they still hold their own in spite of severe competition, and show no signs of becoming antiquated. Classical in form and clear in construction, his music has refinement without weakness, and grace without sentimentality. The estimation in which he was held by German musicians was conclusively shown by the offer which was made to him in 1853 of the Conductorship of the Gewandhaus Concerts at Leipzig.

The chief work of Sir Henry Bishop was done before 1837, but he lived until 1855, and in 1848 was made Professor of Music in the University of Oxford. The operas of Balfe and Wallace have already been spoken of. Mr. Rockstro, in his 'History of Music,' says truly that the unexampled popularity of Mendelssohn undoubtedly deterred many English musicians from trying their strength in oratorio. Pierson, Horsley, Ouseley, Macfarren, Sullivan, Mackenzie and Stanford have, nevertheless, produced works which excited great interest, and even enthusiasm. With reference to these the time test has been applied in some cases with unfavourable results, in some it is still pending. Some of the most enduring work has been done in smaller ways. Church music has absorbed the attention of many of our most gifted musicians. The anthems of Dr. S. S.

Wesley show no signs of diminishing popularity, and his service in E with its famous preface has probably affected the music of the English Church more than any other single composition. To it we owe the lively but often boisterous settings of sacred words which have dulled our ears to the calm beauty of the old music. In later life Dr. Wesley himself regretted this, and the writer possesses a letter from him in which he speaks of his growing affection for and return to the old Church School. Sir John Goss has also acquired enduring fame by finished work on small lines. His anthems and glees are still in constant use. The anthem 'O Saviour of the World' may be cited as one of the most beautiful compositions of this century. Henry Smart and J. L. Hatton, both writers of large works, will probably live in their songs and part-songs. Of the numerous composers who are now fighting their way to the front it would be impossible to speak here. The ferment in the musical world is remarkable, the amount of so-called original composition enormous. Much of it is kept before the public for a time by clever 'log-rolling,' but its ultimate fate is certain.

Estimation of great composers.

In looking back fifty years we find that the estimation of great composers has varied considerably. Handel and Beethoven stand much where they did. Bach has made an astonishing advance. Schubert and Schumann have also established their claims to a place among the greatest men. On the other hand, the popularity of Mendelssohn has slightly waned. Spohr also hardly holds the position he once claimed. Gounod has probably not advanced in public estimation by his recent oratorios, the 'Redemption' and 'Mors et Vita,' and his chances of a prominent place in the highest ranks must still rest on 'Faust' and other operas. Berlioz, who had for years been regarded mainly as an eccentric master of orchestration, suddenly

sprang into the highest favour after the performance of 'Faust' in Manchester under Mr. Hallé. This drew the attention of musical men to other unheard works of his. The gigantic but bizarre 'Messe des Morts' will probably hardly sustain the impression produced by 'Faust,' but the 'Te Deum,' first heard two years ago at the Crystal Palace, is more intelligible, and may live. Brahms has earned for himself a foremost place by his Chamber Music, his German Requiem, and his Symphonies. Too abstruse and learned for the general public, his music appeals to the cultivated artist more powerfully than that of any other living writer. Rheinberger and Raff have also met with much appreciation in this country. The personal enthusiasm of Liszt's followers gained a hearing for many of his compositions which would hardly on other grounds have deserved performance: but, in spite of perfect rendering by the Richter Orchestra, they were received in England with very obviously forced approval.

This is not the place for the statement or discussion of Wagner's theory and practice of the art. The most opposite views about his works are held by people who ought to know, but there can be no doubt that his influence upon English musicians has been profound. The expense and difficulty of giving adequate performance of his operas is so great that they are mainly known through the fragments presented in concert rooms, though this practice is in direct contradiction to the composer's views. When so given, they nevertheless excite the greatest enthusiasm.

Nearly all the great musicians of the Continent have visited this country during the last fifty years, and have kept us *en rapport* with the state of the art in other lands, especially in Germany.

The Prince Consort's influence in this way can hardly be overrated, not merely because it was exerted always on

the side of the best things, but also on account of the welcome which—largely through him—was accorded to great musicians. His intercourse with Mendelssohn is so fully before the world, that it is needless to dwell upon it here. To the Prince we owe the first performance in this country (though not public) of Bach's 'St. Matthew Passion,' Mendelssohn's 'Athalie' and 'Œdipus,' and Schubert's Symphony in C. The quickening effect of Mendelssohn's many visits is still evident. Spohr, Berlioz, and Wagner were all warmly received. Almost every singer and performer of note has challenged the criticism of the London musical public. Some, like Madame Lind-Goldschmidt, have made this country their home; others, like Joachim, never fail to make a stay of some months.

Prospects of music in the future.

What, then, is the prospect for music in England? If an almost feverish activity and competition in every branch —composition, performance, and criticism—could bring about great results, we need have no fear. For composers, the constantly increasing claims of social intercourse are the great danger. Individuality must suffer from the bustle and friction of life.

Pecuniary gain, the lowest but not the least powerful incentive, is not on the side of the best work. Single songs have brought to their fortunate composers more money than almost any oratorio. Sullivan himself is said to have received 700*l.* for one song. Few publishers would undertake to bring out a cantata or symphony unless it had been adopted by the committee of one of our great festivals. Honour, therefore, is due to many composers for a large amount of work that could never be remunerative. A large proportion of music that is written now impresses us not so much by its depth of thought and feeling as by the force and fury of its expression. With regard to literature, John Morley has recently said, 'The probabilities are that we are

now coming to an epoch of a quieter style.' In music too, in sacred music especially, a similar tendency is much to be desired, but signs of it are so far wanting.

Musicians can at least feel secure that their art is no longer regarded by thinking men merely as the most expensive of noises, or as a means of obtaining pleasurable sensations. Its effects on mind and heart, though not yet understood, are nevertheless studied, and philosophers like Herbert Spencer forecast for it a future beyond the aims, beyond even the dreams, of musicians themselves.

WALTER PARRATT.

PRINTED BY
SPOTTISWOODE AND CO., NEW-STREET SQUARE
LONDON

00037290

Digitized with financial assistance from the
Government of Maharashtra
on 05 October, 2018